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MOTHER'S MANUAL,

AND

INFANT INSTRUCTER;

DESIGNED FOR

INFANT OR PRIMARY SCHOOLS,

AND FAMILIES.

ILLUSTRATED WITH ABOUT 300 CUTS, ALL OF WHICH ARE CORRECTLY EXPLAINED IN THE ALPHABET OF NATURE, AND ADAPTED TO A REGULAR COURSE OF INFANT INSTRUCTION.

BY M. M. CARLL.

SECOND EDITION,

IMPROVED AND ENLARGED.

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ADVERTISEMENT.

THE first edition of the Mother's Manual having been entirely sold in a few months, the author has prepared a second, much enlarged and improved; in which the ideas suggested in the first have been carried out and simplified. The cuts have been fully illustrated and explained; so that parent, teacher, or child, may easily follow the course laid down, to any extent.

ENTERED according to Act of Congress, in the year eighteen hundred and thirty-three, by M. M. CARLL, in the Clerk's Office of the District Court of the Eastern District of Pennsylvania.

STEREOTYPED BY J. HOWE.

PREFACE.

In the following pages, an attempt has been made to arrange a series of exercises, founded upon the primary principles, constituent of the mind. Among these principles, the *sensitive faculty* has been regarded as fundamental, and as the instrument by which the other faculties are successively formed. The principle of *curiosity*, *imitation*, the influence of *first impressions*, and the power of *habit*, have also been regarded as important *mediums* in intellectual development, and in the ultimate formation of human character.

In this work we have regarded it as an established truth, that the development of the mental faculties, like those of the physical powers, is the result of exercise; that successive order is to be observed in the gradual unfolding of these faculties, and that each requires *appropriate* exercises adapted to its nature. The *moral* and the *intellectual* powers, *sensation*, *memory*, *attention*, *thought*, *understanding*, *discrimination*, *judgment*, and *reason*, each requires a process of its own.

In order, however, to render this, or any other system, effectual, there is one principle that must never be lost sight of by parents or instructors,—a principle, which from its comprehensive nature, and the important consequences flowing from it, ought to form the *first lesson*, and *first habit*, ought to constitute the vital spirit of every future relation in life, pervade the whole character, and form the very atmosphere of the nursery and school-room: I mean OBEDIENCE.

Obedience stands in the same relation to the moral virtues, that the sensitive faculty does to the intellectual powers; with children it is the substitute for knowledge and experience. The child who is obedient avails himself of the judgment of his seniors, and will understand and practise the duties of his various relations, the filial, the fraternal, the social and religious; since from habitual obedience to parents and instructors, the transition to obedience to civil, moral and divine laws, is easy and natural. With all thy teaching therefore, teach thy child *Obedience*.

Of all ideas or conceptions of which the human mind is susceptible, that of the *Supreme* is the most exalted and sublime. The name of God is HOLY, as well as the names expressive of *his attributes;* it ought not, therefore, to be rendered common, or repeated in a thoughtless manner, lest it should be introduced into the minds of children among light and trifling things, which soon cease to excite thought or emotion. The occasions for presenting this great idea, should be selected with the utmost care, at a time when their attention has been particularly awakened by some special subject, the exhibition of some manifest instance of power or fitness in the works of God, or when their affections have been softened by some instance of mutual love and kindness. Seize this moment, the impression will remain, and instruction will be sealed.

NOTE.—*This System of the Infant's Instructor was prepared at the invitation of the Controllers of the Public Schools of Philadelphia; and, being approved, received a premium of one hundred dollars, and is now used by them.*

THEORY.

EXPLANATION OF THE PLAN.

I AM encouraged to offer the following Theory to the Board of Control, (see note, page 4,) as one embracing *principles* on which a detailed system may be founded. It is respectfully offered to their consideration, and acceptance if approved, as the result of considerable reflection and experience.

I will first briefly state the leading *principles*, which must, I conceive, form the *basis* of any plan that can entitle it to the rank of a System of Education.

Inasmuch as such a system must involve a series of exercises intended to operate upon *mind*, some knowledge at least, of the mental structure, or of that portion of our nature upon which it is called to operate, ought to be possessed. We must, therefore, call to our aid, those lights, which Intellectual Philosophy has shed upon this intricate subject, as well as the observations we have been enabled to make upon the operations of our own minds. The result of this inquiry will be the establishment of the following principles :—

1. That man is a Religious, Moral, Intellectual and Physical being; and that *exercise* and *culture*, adapted to each of these attributes of his nature, are necessary for its growth and development.
2. That the Intellect is not *homogeneous*, but consists of a variety of faculties, and powers, original and acquired, some of less and some of greater dignity, but each essential to the well-being and perfection of the whole.
3. That the *arrangement* of these faculties ought to be understood by those engaged in mental discipline, in order to know where to *begin*, and how to progress in calling them into proper exercise.
4. That the *order* of development will necessarily be *simultaneous*, as well as *progressive*, or in other words, the

exercise of one faculty, will influence others, as the vibration of one chord, will cause others to vibrate also; still a series of exercises bearing upon any one faculty in particular, is not only practicable but may be done with facility.

5. The adaptation of exercise, to the development of a particular principle of the mind, is a discovery, and next to the methods of *induction* and *analysis* should be regarded as a decided improvement in scholastic discipline.
6. That these faculties of the understanding, are Sensation, Perception, Conception, Imagination, Fancy, Memory, Abstraction, Discrimination, Reflection, Judgment, Reason.
7. That these faculties may be arranged under three general heads, namely, the *Perceptive*, *Expressive*, and *Reflective;* the first relating to physical objects, which address the senses; the second to *Communication*, whether by countenance, gesture, oral expression, or artificial signs, and the last to abstraction or Metaphysics, the Mathematical Sciences, Theology, &c.
8. That a series of lessons, affording the requisite exercise to the perceptive, expressive and reflective powers of the mind, to the religious and moral affections of the heart, and the physical energies of the body, is the grand desideratum, and forms the object and aim of those who feel and see the vast and incalculable importance of Education.
9. Since these are the God-like faculties with which man is endowed, and the seeds or first rudiments all exist in the infant mind, it follows that children should be treated by their teachers accordingly, and governed like rational beings; that such motives to exertion, as are in accordance with this his mental character and immortal destiny should be presented; voluntary, active, ennobling motives, tending to call forth the better sentiments and powers of his nature, should be substituted for corporal punishment, fear and restraint; and that punishment should not be resorted to, but when affection and reason fail of their desired effect; in short, punishment should

form the *exception* and not the *rule* in scholastic government.

10. That it is essential to full and complete success, in forming the mind, that we should know the *starting point*, know *where* and *how* to begin, that we may commence neither at the end, nor yet in the middle, but at the beginning.
11. That commencing with books, letters, or artificial signs, is a great mistake, contrary to nature, and renders that discipline, which, if nature and reason were consulted, would be a most pleasing and delightful recreation, one of the most irksome and disgusting both to teacher and pupil.
12. That artificial signs or letters, are a fourth or fifth remove from the *punctum saliens*, the starting point; inasmuch as they are the representatives of *sounds*, forming *syllables*, these forming *words*, these in their turn representing *ideas*, and these *ideas* representing THINGS. The order pointed out by nature is, that we should begin with *things*, from these proceed to their mental images or *ideas*, thence to their *names* embodied in oral sounds, thence to *written words*, and thence to the artificial signs or *letters*, with which words are composed.
13. That the *alphabet of Nature*, written in golden letters in the heavens, and on the earth in her three great kingdoms, the animal, vegetable, and mineral, wrought in mystic characters, in every flower, inscribed on every tree; that this is the *alphabet*, which the God of nature presents to each appropriate sense, which is destined to convey a lasting image to the mind.
14. That every object and quality in nature, has its appropriate correspondent in the mind, as well as its appropriate *sense*, to serve as a *medium* of communication, and to produce the intended effect on the *organic forms* of the brain.
15. That in like manner *love*, benevolence, order, harmony, beauty, sublimity, have their proper correspondents in the intellectual and moral constitution of man.

16. That *thought* can in no wise exist without *affection;* since a being destitute of the affections of the *will*, or of *desires* of some kind, either moral, intellectual, or sensual, could neither think nor act. It being this affection that forms the inward spring of effort or action, and which sets the thoughts in motion.
17. Each affection, whether good or bad, acts upon its appropriate class of ideas or thoughts, and suggests the *means* necessary for the accomplishment of the will or desire.
18. Each sense conveys its own class of ideas, and is furnished with its proper excitement in the objects of nature, their qualities and properties. The *eye* finds its proper stimulus in *light*, *color*, *form*, *magnitude*, *distance;* the ear, in every variety and mode of *sound;* the sense of smell in *odors;* the taste in *flavors;* and the touch, which is an universal sense, in *temperature*, *hardness*, *softness*, *roughness*, *smoothness*, &c.
19. Commencing with the alphabet of *nature*, the *faculty* with which we must begin our operations is manifestly *sensation;* it is here the *foundation* must be laid, broad and deep, on which that superstructure is to be reared, whose stability, elevation and symmetrical proportions will depend upon the care and pains bestowed upon cherishing *Infantile Affections*, and upon the accuracy of *First Impressions.*
20. That there are two modes of receiving first impressions, viz., from books or from words, which are the signs of ideas, which ideas are the images of things; and from observing the *things* themselves. In the former mode words are learned instead of things; in the latter, the things themselves; and the comparative permanency and accuracy of the impressions received in these respective modes, is similar to the correctness and vividness of our ideas of a geographical description derived from reading, and from actual survey and observation.
21. There can be no hesitation in forming a decision with respect to these two modes of receiving first impressions; in the one case, the child who begins with arti-

ficial signs, will have his mind comparatively void of ideas, and consequently destitute of the materials of thought, whilst a child instructed after the other method, will have his mind stored with images and forms of things: the one will be stupid and inactive, the other intelligent and lively; the one unobservant and incurious, the other habitually curious, and attentive to the things around him; the one will be passive in the hands of his instructor, and dull of apprehension, because there are no correspondent images in his mind to respond to the words which he sees or hears pronounced; the other possessing the echo in his mind, has a spring of voluntary activity within, which excites his affections, and puts the whole machinery of his mind in motion.

22. That it is of vast importance to take advantage of the *curiosity*, *activity* and *sprightliness* of children, and whilst every object presents itself to their notice, in all the freshness and interest of novelty, to seize this happy moment for turning their attention to the *forms*, external *qualities* and *uses* of the various objects around them; since the *habit of observation*, if once thoroughly formed, will inevitably insure their future progress in knowledge, and the business of education will be half completed. Nature's ample volume is now spread before them, and every page affords the materials of reflection.

23. This habit of taking notice of things, will render expensive cabinets, at least in this stage of our pupil's advancement, unnecessary; for the judicious teacher will find in his immediate neighborhood, these materials for first impressions, a grain of sand, a stone, a leaf, a flower, a bird, nay, the feather of a bird will form an interesting subject to the curious mind, accustomed to observe and reflect.

24. The next class of faculties to be brought into exercise are the *expressive*, or such as relate to *communication* in all its forms, whether by the countenance, by oral sounds, or artificial characters. Besides the physical

powers, which are now to be brought into exercise, there are the mental ones of Memory, Understanding, Discrimination, and Judgment, and all these would find their appropriate discipline, in a graceful action and elocution, the study of languages, rhetoric, logic and composition.

25. The highest class of faculties are those which we have called *reflective*, and which may be regarded as a combination of all the rest, controlled and directed by a chastened imagination, correct judgment, sound reason, and a pure religion; equally removed from bold presumption on the one hand, and a blind superstition on the other.

26. It has been said, that "Whate'er is best administered, is best;" this remark is partially, if not wholly true, and applies in a peculiar manner to the art of imparting instruction. In this, so much depends upon the tact of the teacher, his power of exciting curiosity, and of keeping attention awake, his facility of communicating knowledge, and of accommodating himself to the apprehension of young persons, by ready and familiar illustration, that where these qualities are wanting, no theory or system, however excellent in itself, can supply the deficiency.

27. As it will be necessary to avail ourselves of the love of novelty and the curiosity so common to the state of childhood, in order to induce a *habit* of *observation*, which will naturally lead to attention to the *forms* and *qualities* of things; and as this habit is to be kept alive, and carried through all his future progress in science, it will be found extremely important to adopt the proper means of fixing this *habit*, before others usurp its place.

28. Hence it would appear that a *System of Instruction*, adapted to Infant or Primary Schools, with a view of forming this habit, and of storing the mind with the images of things, is that which is at present chiefly called for.

29. That children of a tender age, may be rendered comparatively intelligent, previous to their commencing the

study of artificial signs, has been demonstrated in our Infant Schools, and is no longer a matter of theory or speculation, but of absolute certainty.

30. There are many excellent treatises extant, upon the various branches of science, usually taught in our schools and colleges; but, what is chiefly wanted, is 1. a *System adapted to the Infant Mind*, prior, as well as subsequent to the study of artificial signs; 2. exercises adapted to the development of the mental faculties in their *order;* and 3. a better *method* of teaching; a method which will substitute *things* for mere words, *observation* and attention, for indefinite verbal description; *Understanding* for *Rote* and *Memory*, rational *Analysis* and *Induction*, for *mechanical routine*.

31. It is evident, that before we can have a correct theory or system of Education, the constituent principles of the mind must be clearly ascertained, their arrangement from the lowest to the highest, their *order* and the best *means* of their development: this will naturally lead to a system embracing a series of lessons or exercises adapted to the culture of each particular faculty, in its relation to the whole Mind, until the *Heart*, the *Head* and *Hands*, shall each receive its due share of culture, and man be elevated to that dignity to which his wonderful powers of mind and body entitle him.

Such a Manual of Infantile Instruction as is here contemplated, might, with great advantage, form a part of *Female education*, with reference to their future maternal relation; and thus every female so disposed would have it in her power to unite in her own person the character, offices, and duties of Parent and Preceptor, and, like a guardian angel, minister to the *mind*, as well as the body of her offspring.

OUTLINE OF A SYSTEM.

INASMUCH as the successful progress of the pupil will mainly depend upon the proper exercise of the *sensitive faculty*, and the accuracy of *first impressions*, it will be necessary, at present, to confine ourselves to this.

The outline of a system, embracing the foregoing principles, as applicable to the development, and proper exercise of sensation and *perception*, as preparatory to the higher faculties of *reflection*, *understanding* and *reason*, will now be attempted.

To enter into detail, and trace out all the principles in their particular relations, will be the object of the Manual hereafter to be submitted; the design, at present, being merely to demonstrate the practicability of so framing a series of lessons or exercises, as that they shall have a direct bearing upon some particular mental faculty, and of course an indirect influence upon the others.

We will now take a child of two years. It is evident that there must be a subject to operate upon, and *means* or instruments to operate with. What are they? First in the subject or mind of the child we have *affections*, *desires*, *inclinations*, *passions;* we have further the principle of *imitation*, *curiosity*, *activity;* we have the powers of *perception*, *attention*, *observation*, *discrimination*, *utterance;* together with the *senses*, through which the images or impressions of things are transmitted to the mind.

The instruments with which we are to operate, are first, *affection* and *kindly feeling*, which are manifested in look, manner and tone of voice, which the child always recognizes; and second, the objects in the world of nature, together with their qualities, which address the senses, exciting observation and reflection, and by their endless combinations, affording the means of mental discipline.

It would appear that one of the first things requiring attention, is the *first impressions*, that they be distinct and accurate; the second, that the habit of *observation* be formed as

early as possible; and this, the *curiosity* so natural to children renders easy, if nature is not counteracted by artificial and injudicious methods.

After those impressions or sensations caused by maternal care and endearment, arise most probably, those which are produced by the artificial objects with which he is surrounded, such as the articles in his chamber, or in the room in which he is accustomed to play.

He soon becomes acquainted with their *forms*, and *external qualities*, and learns to distinguish them, long before he can pronounce their names. The reason is manifest; he has been accustomed to *see*, and *handle* them, and the class of *ideas*, which these two senses convey to his mind, have become familiar.

FIRST, OF FORMS.

Simple *forms* will first be presented to his notice, which are furnished with endless variety, in the *animal*, vegetable, and mineral kingdom.

Forms of *beasts*, *birds*, *fishes*, *reptiles* and *insects*, will be sure to engage his attention and excite curiosity, if introduced to his notice in a proper manner.

These may be presented, (when the living animal cannot be seen,) on *cards*, taking due care that they be accurately drawn and neatly colored, with the *name* printed underneath.

Cards containing *trees*, fruit trees, forest trees, flowers, roots, leaves, &c., with form and coloring after the same manner; or the flowers themselves when they can be obtained.

Shells and *minerals* may be obtained, especially the latter, without much difficulty, and arranged according to their four grand divisions, of *earthy*, *saline*, *inflammable*, and *metallic*.

After these objects shall have become familiar to the little pupil, let him next proceed to notice the

DIFFERENT PARTS.

In the animal kingdom, those parts, more especially, on which the *classification* is afterwards to turn; such as the structure and situation of the teeth and claws, color, and other more striking external characters: this exercise will neces-

sarily require closer *observation* of the *forms* of things, and lead to the next act of the mind, which is

COMPARISON.

In making comparisons, we first notice *differences* and next *analogies* or *similitudes*. This will give rise to a new and most useful series of lessons, and by comparing the subjects of different *kingdoms*, *classes*, *orders*, *genera* and *species*, bring into exercise the all-important faculties of *attention* and *discrimination;* which by degrees will ripen into judgment.

EXTERNAL QUALITIES.

These will come next to be considered, and will introduce a new class of ideas, and will require a new class of words to express them. This will embrace another series of interesting lessons, which may be extended to all things animate and inanimate, solids and fluids, and, in short, every object which nature presents.

A consideration of qualities, will bring into exercise the faculties of attention, discrimination, and the perceptive faculty in general, since the different qualities of things, such as color, sound, odor, flavor, &c., address all the senses in turn, and bring them into use and operation. These *qualities* of things will naturally lead to

USES.

The relation of *uses* is a subject full of interest, and will afford an opportunity for a very important series of lessons, and will introduce many new ideas, arising out of the productions of nature and their application in various arts and manufactures.

RELATIONS

will form another series of lessons not less interesting, especially that of *fitness* and *adaptation*, as the *covering* and *structure* of *birds*, in relation to their element the air; of the *covering* and *conformation* of *fishes* to their element; of *quadrupeds* to theirs, &c. The infinite variety of those relations arising out of *cause* and *effect;* of *means* to an *end;*

and of the *harmonies* of things in general; especially that beautiful harmony subsisting between

THE SENSES,

and their appropriate objects, as found in the *forms* and *qualities of things*. This will afford a variety of interesting lessons: nay, each sense, and each external quality will afford exercises well calculated to elicit thought and form the habit of observation.

The relation, for example, between the organ of vision and *light*, the known properties of which, such as refraction, reflexion, &c., may, by a few familiar illustrations and experiments, be brought down to his apprehension. *Color*, *figure*, *magnitude*, will furnish subjects of deep interest, and lay the foundation of the beautiful science of *optics*, and of geometrical figures.

The sense of hearing too, in its relation to *sound*, will be no less attractive, and will naturally lead to the subject of music, and the science of acoustics generally. The same may be said of the remaining senses. In short, the subject of relations is inexhaustible, and will apply to every created thing, both in general and in particular.

Thus after due exercise upon individual *forms*, *qualities* and *uses*, we from simple ideas proceed to those a little more complex, by introducing to the notice of our little pupil, easy and simple combinations, with a view of introducing

TRAINS OF THOUGHT,

which will arise from, and be naturally connected with some *prominent object:* as for example, what are the means of *defence* possessed by different animals? Here *means of defence* is the prominent idea, and will naturally suggest a train of thought such as this;—some animals have *horns*, as the *ox*, *cow*, *deer*, *sheep*, &c.; some have *teeth* and *claws*, as the *cat*, *lion*, *tiger*. Again, what are the different parts of vegetables used by man? Of some we use the *root*, as the *potato*, *turnip*, *beet;* some the sap, as the sugar-cane; of some the bark, as cinnamon; of some the *seed*, *fruit*, *leaves*, &c.

After passing through a course of similar lessons, he might then pass on to

ASSOCIATION OF IDEAS,

in which not merely simple trains of thought, but *collateral* and *relative* ideas, which naturally suggest themselves, might be introduced, all arising of course out of his previous stock of materials collected from the objects of sense.

The various *particular* objects which have been exhibited to his notice heretofore promiscuously and without arrangement, may now be made use of to accomplish one of the most important purposes, viz: that of introducing

ORDER

into the mind. This noble use will be effected by arrangement or *classification.* Here the aid of science will be called in, to assist the teacher in reducing the chaotic mass to beauty and order. The kingdoms of nature will obey this law, and all things in her three grand departments will arrange themselves each under its proper *class, order, genera* and *species;* and the mind, accustomed to survey this beautiful *harmony,* will in due time become *herself harmonious.*

The perceptive faculty, having been duly exercised, curiosity awakened, the habit of observation formed, and a considerable stock of images stored up, our little pupil will be prepared to commence the study of artificial signs, or the simple elements of written language. Now the benefit of his previous discipline will be very apparent; instead of being entirely devoid of ideas, his mind will have been stored with mental images, accurately impressed and well arranged; and the inestimable habit of attention and observation secured. Instead of learning sounds which are strange to his ear, and which convey no image to his mind, every word that is the sign of a sensible object, or of a sensible quality, will be understood. His mind, instead of being merely passive, will become active with voluntary energy.

Having overcome the chief obstacles, he will now have a single object in view; and this his acquired habits will soon enable him to achieve.

Thus he will pass on, by a just method of observation, synthesis and analysis, to the more exalted branches of science, and to the development of the higher powers of his mind; rising through all the gradations of *perception, expression* and *reflection*, with their proper faculties and powers, he will become not only a thinking, but a moral and religious being, prepared to enter upon another state of nobler activities and uses in the world of *Causes*.

BEAR.—Third Order.

GOAT.—Sixth Order.

TIGER.—Third Order.

BISON.—Sixth Order.

GENERAL PREPARATORY REMARKS,

AND

DIRECTIONS FOR THE TEACHER.

ALL natural objects are divided into *three* grand departments, called *kingdoms;* viz. the *animal*, *vegetable* and *mineral*. These kingdoms are again subdivided into *classes*, *orders*, *genera*, and *species*.

ANIMAL KINGDOM.

The following classification is founded upon the recent observations and discoveries of the great French Philosopher *Cuvier*. He divides the animal kingdom into two great divisions. 1. VERTEBRAL; such as man, quadrupeds, birds, fishes, &c., having a back-bone, skeleton, and red blood: and 2. INVERTEBRAL; such as worms, insects, shell-fish, &c., having no skeleton, and white blood.

The first of these divisions are also called *warm-blooded;* the last, cold-blooded. The *warm-blooded* animals are divided into two classes. A part of them produce their young alive, nourish them with their own milk, from organs called their mammæ or breasts; and hence called *mammalia* or *mammiferous* animals. This class includes man, quadrupeds, whales, porpoises, &c. Another produces their young by means of eggs; this class includes *birds*.

The cold-blooded vertebral animals also form two classes. The first contains those which breathe air only, and cannot exist without it, as tortoises, frogs, serpents, &c. These are called *reptiles*. The second contains those which breathe by gills or branchiæ, through the medium of water. This class includes all true *fishes*.

The invertebral animals are divided into five classes, as follows: 1. Insects. 2. Crustacea; as the lobster, crab, and

craw-fish. 3. Mollusca; as the oyster, the snail, clam, cuttle-fish. 4. Vermes, or worms; as the earth-worm or leech. 5. Zoophytes; as the star-fish, the sea-urchin, the sea-anemone, the sun-fish, the polypus, the sponges, and the animalcules.

The animal kingdom is arranged into *two* grand divisions, and *nine* distinct classes, as follows:

1. VERTEBRAL ANIMALS.

1. Mammalia, } Warm-blooded.
2. Birds, }
3. Reptiles, } Cold-blooded.
4. Fishes, }

2. INVERTEBRAL ANIMALS

5. Insects.
6. Crustacea.
7. Mollusca.
8. Vermes, or worms.
9. Zoophytes.

The smaller divisions are, *classes*, *orders*, *genera*, and *species*.

The CLASSES are distinguished by some remarkable peculiarities of structure, which are common to all the animals included under each of them. Thus in the class mammalia, the order quadrumana includes those animals which have hands upon all four of their extremities; such as monkeys and apes: the order ruminantia, those which ruminate or chew the cud: the order carnivora, those adapted to feed principally on animal food.

ORDERS are subdivided into GENERA. These comprise animals which have a general external resemblance, a kind of family likeness. Thus the genus felis includes all those of the cat kind; and these animals, although differing one from another very much in size and color, have yet a close resemblance in their general form, figure, character, and habits of life. The genus canis includes those of the dog kind; the wolf, the fox, the jackal, and the domestic dog. Thus, too,

the horse, the ass, and the zebra, are of the same genus equus, on account of their obvious general similarity.

Again: GENERA are made up of SPECIES. Each distinct sort of animal constitutes a species; and they are distinguished from each other, by their size, color, form, and various other circumstances of external appearance.

There are as many species, as there are sorts of animals. Thus the cat is one species, the tiger another; and the lion, leopard, jaguar, and catamount, are also separate species; but taken together, they constitute the genus felis. Thus, too, the genus canis contains the dog, the wolf, the jackal, and the fox, which are all so many distinct species. The genus sciurus contains the grey, red, striped, and several other kinds of squirrels. In treating of any particular animal, naturalists designate it by a name derived from its genus and species. For example—the different species of the genus *felis* are distinguished as follows: the lion, felis leo; the tiger, felis tigris; the leopard, felis leopardus; the jaguar, felis onca; the lynx, felis lynx; the serval, felis serval. In the genus canis, the dog is called canis domesticus; the wolf, canis lupus; the fox, canis vulpis; &c. This is the scientific or systematic name.

Each sort of animal constitutes a SPECIES; a number of species forms a GENUS, or family; those genera which resemble each other form an ORDER; and those, having more remote points of resemblance, are divided into CLASSES.

CLASSIFICATION.—MAMMALIA.

It is principally from regard to the structure of the *teeth* and *claws*, and the consequent nature of their *food*, that naturalists have proceeded in the arrangement of the Mammalia.

The *orders* thus formed, are *nine* in number, as follows:—

1. The *Bimana*, or *two-handed* animals. Man is the only example of this order. He has hands upon his superior extremities alone. He has nails of a thin and delicate texture, which give to his thumb and fingers a wonderful delicacy of touch.

2. The *Quadrumana* or *four-handed* animals, comprising apes, monkeys, and baboons. They have hands upon all four of their extremities, but less perfect than those of man.

3. The *Carnivora* or *carnivorous* animals. These have no hands, but their feet are furnished with claws. This is a very extensive order, and embraces a great variety of animals.

These three orders have all the three kinds of teeth; which differ, however, in shape and strength, according to the habits and food of the different species.

4. The *Rodentia* or *gnawers;* so called from the structure of their fore-teeth, which are particularly adapted for gnawing. They have no canine teeth, and their claws are similar to those of the *carnivora*. This order contains rabbits, squirrels, rats, &c.

5. The *Edentata*, or *toothless* animals; so called because they are deficient always in the incisive teeth, and sometimes have no teeth at all. Their toes are terminated by large and crooked nails, which obstruct both their sensations and motions. The sloth and armadillo are in this order.

6. The *Ruminantia* or *ruminating* animals, are those which chew the cud. They are cloven-footed, and have, moreover, no incisive teeth in the upper jaw. Among these are the ox, camel, lama, stag, and antelope.

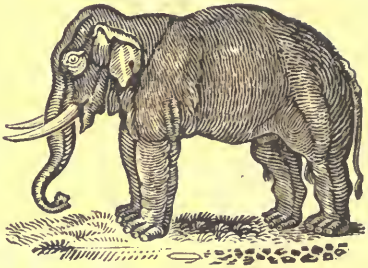
7. *Pachydermata* or *thick-skinned* animals. This order includes a considerable variety of other animals with hoofs, but which do not ruminate; as the horse, the wild-boar, the hog, the tapir, and the elephant.

8. The *Cetacea*, or animals of the *whale* kind, distinguished by having no posterior extremities, and their anterior so constructed as to answer the purpose of fins. In this order are whales, porpoises, and dolphins.

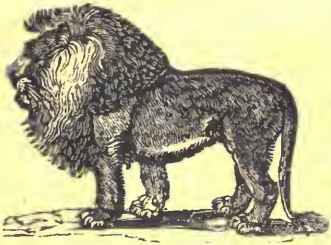
9. The *Marsupialia*, which are distinguished from all others by the possession in the female of a *bag* or *pouch* (marsupium) on the outside of the abdomen, for the purpose of holding their young after birth. Such are the kangaroo and opossum.

MAMMALIA—Specimen of each order.

MONKEY.—Second Order.



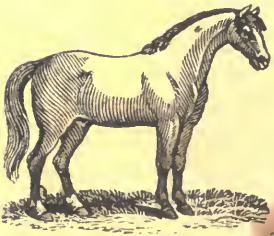
ELEPHANT.—Seventh Order.



LION.—Third Order.

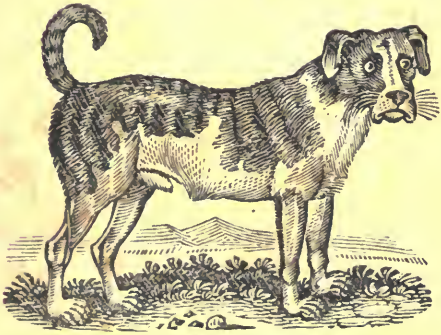
BEAVER.—Fourth order.

SHEEP.—Sixth Order.



HORSE.—Seventh Order.

WHALE.—Eighth Order.



DOG.—Third Order.

ARMADILLO.—Fifth Order.

KANGAROO.—Ninth Order.

ALPHABET OF NATURE.

FIRST SERIES.

ANIMAL KINGDOM.

QUADRUPEDS, OR MAMMALIA.

DIRECTION.

PRESENT a card, containing a considerable number of quadrupeds *promiscuously* arranged, to the notice of the child.

The first thing requisite is, that he become familiar with their *forms*, insomuch that he can readily distinguish them by name.

At the time any animal is pointed out, let the *name* be distinctly and correctly pronounced by the teacher, and repeated by the child.

The card should contain all the more prominent quadrupeds belonging to the different *orders*.

They should be kept at this exercise a sufficient length of time to render them familiar with the various *forms* of the animals; this may be tested by the animals being presented singly on different cards.

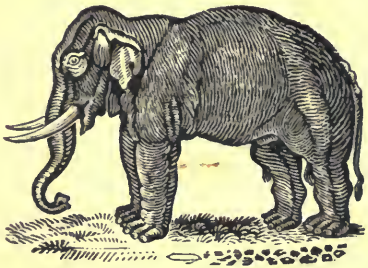
SECTION II. After having studied each animal as a *whole*, let them proceed to the various *parts*, especially those parts upon which the *classification* turns.

The *head*, *body*, *limbs*, *feet*, *mouth*, *teeth*, *tail*, *claws*, *hoofs*, &c., must all be noticed, not only for the sake of knowing the parts, but also for the sake of the *general terms*, which express them.

In the next place, direct their attention to the *color* and the *covering*, whether *hair*, *wool*, *fur*, *feathers*, *scales*, &c.

The kind of *food* upon which they live, as *grain*, *grass*, *flesh*, &c.; that is, whether they are *herbiferous*, *granivorous*, *carnivorous*, or *omnivorous;* whether *gregarious* or *solitary*, *amphibious* or confined to the land or water.

As the terms which express these different parts are *general*, and apply to all animals, let the child become familiarized with them at once.



ELEPHANT.—Seventh Order.

What animal is this? *Ans.* An Elephant.

Do you see his form and large body? *Ans.* Yes.

What are its different parts?

Ans. Body, *sides*, *back*, *head*, *tusks*, *trunk* or *proboscis*, *eyes*, *ears*, *neck*, *legs*, *feet*, *toes*, *tail.*

What is the trunk for?

Ans. To pick up his food, which he carries to his mouth.

Can he drink with his trunk?

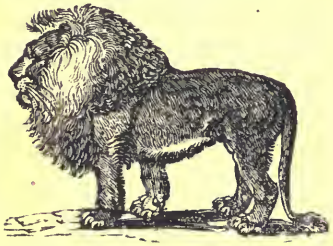
Ans. Yes: he sucks up the water, and then turns it into his mouth.

What comes from the Elephant's tusk? *Ans.* Ivory.

What is his covering? *Ans.* Hair.

What is his food? *Ans.* Vegetables.

Is he gregarious? *Ans.* Yes; they herd together.
What can you say of his teeth?
Ans. No fore-teeth in *either* jaw.
What of color?
Ans. Some elephants are brown, some white.



LION.—Third Order.

CAT.—Third Order.

What animal is this? *Ans.* A Lion.
Do you see his form? *Ans.* Yes.
What are his different parts?
Ans. Head, mane, body, sides, back, legs, claws, teeth.
What is that at the end of his tail? *Ans.* A tuft.
What sort of teeth and claws has the Lion?
Ans. Sharp.
What is his food? *Ans.* Flesh.
What are flesh-eating animals called?
Ans. Carnivorous.
What is his covering? *Ans.* Hair.

BEAVER.—Fourth order.

GUINEA PIG.—Fourth order.

What animal is this? *Ans.* The beaver.
Do you see his form? *Ans.* Yes.
What are the parts?
Ans. Head, body, flat tail, short legs, toes, teeth, small ears.
Why is the tail flat? *Ans.* He uses it for a trowel.
What is that?
Ans. A flat tool used by bricklayers. He uses it to build his dam.
What kind of teeth has he?
Ans. Two cutting-teeth in each jaw.
Does the Beaver belong to the land or the water?
Ans. Both, and he is called amphibious.
What is his covering? *Ans.* Fur.

SHEEP.—Sixth Order.

COW.—Sixth Order.

What animal is this? *Ans.* A Sheep.
What are the different parts?

Ans. Head, mouth, ears, body, tail, legs, feet, eyes.

What can you say of his teeth?

Ans. He has *no teeth* in the upper jaw.

What kind of feet has he?

Ans. Hoofs, divided in the middle, or cloven-hoofed.

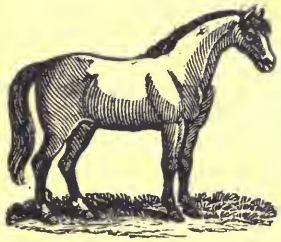
What is his covering? *Ans.* Wool.

Is the sheep innocent? *Ans.* Yes.

What is a young sheep called? *Ans.* A lamb.

What is the flesh called? *Ans.* Mutton.

What is his food? *Ans.* Grass, turnips, &c.



HORSE.—Seventh Order.

ZEBRA.—Seventh Order.

What animal is this? *Ans.* A Horse.

Do you see his form? *Ans.* Yes.

What are the different parts?

Ans. Head, body, limbs, tail, hoofs, ears, mouth, teeth, eyes.

What sort of teeth has he?

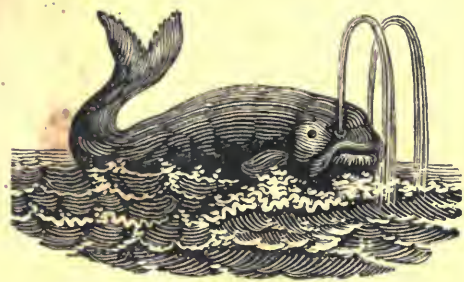
Ans. Blunt fore-teeth in both jaws.

What kind of hoofs? *Ans.* Solid hoofs, not divided.

What is his food? *Ans.* Grass and grain.

What kind of tail? *Ans.* Long and bushy.

What is his covering? *Ans.* Hair.



WHALE.—Eighth Order.

What animal is this? *Ans.* A Whale.
Where does it live? *Ans.* In the sea.
What are its parts?
Ans. Head, body, large mouth, eyes, fins, tail, breathing holes.
What is the covering of the whale? *Ans.* Skin.
What do we get from the whale?
Ans. Oil, whalebone, and spermaceti.
From what part is the whalebone taken?
Ans. It grows from the upper jaw.

SLOTH.—Fifth Order.

KANGAROO.—Ninth Order.

SECOND SERIES.

AVES, OR BIRDS.

PREPARATORY OBSERVATIONS.

THE second great class of the animal kingdom is that of birds.

This class is divided into *six orders*, viz., *accipitres*, *picæ* or *scansores*, *anseres*, *grallæ*, *gallinæ*, *passeres*.

The first order, *accipitres*, includes birds of prey, distinguished by strong hooked beaks and claws, such as the *Eagle*, *Vulture*, *Hawk*, *Owl*, &c.

The second order, called *picæ* or *scansores*, contains all birds of the *Crow* and *Jay* kind, *Parrot*, *Woodpecker*, *Kingfisher*.

The *anseres* form the third order; these are web-footed, and include the *Swan*, *Goose* and *Duck* tribes; *Gulls*, *Penguins*, &c.

The fourth order is that of *grallæ* or *waders*, having lengthened legs and long bills, adapted for wading and searching the bottoms of pools and shallows. The *Heron* tribe, *Curlew*, *Plover*, *Snipe*, &c., belong to this order.

The fifth order is allied to the *Poultry* or *Domestic Fowl*, and includes the *Pheasant*, *Partridge*, *Turkey*, *Peacock*, &c.

The sixth and last order is called *passeres*, including small birds in general; as the *Pidgeon*, *Thrush*, *Lark*, *Finches*, &c.

DIRECTION.

These cards, like those of quadrupeds, should contain a sufficient number of specimens of each *order*, accurately drawn and colored from nature.

Then let the same plan be pursued in presenting the bird cards, dwelling first upon the *forms* of each as a *whole*, and next proceeding to the different *parts*.

The *size* and *form* of the bird, the shape and length of its *bill*, the form of its *feet*, whether constructed for *swimming*, *walking*, or *climbing*, the length of its *legs*, *wings*, &c., must be attended to, and the attention of the child habitually directed to every particular; as the PRIMARY object now is, to form a *habit* of *attention* and *discrimination*, and awaken *curiosity*.

Some birds are rapacious, and, like the carnivorous animals, live upon flesh; many of the smaller tribes feed upon insects, worms, and seeds. Most birds are gregarious and migratory; some are *aquatic*, others live exclusively on land. Many of these distinctions are plainly seen in the conformation of the *bill* and *feet*.

The teacher will not forget that there is another interesting point of view, in which this beautiful race is to be considered, arising from the different modes of constructing their nests.

There are the *Miners*, such as the *Bank-Swallow*, the *Bee-eater*, the *Petrel*, the *Puffin*, the *Penguin;* the *Ground-builders*—the *Mason Birds*—the *Carpenter Birds—Basket-makers—Weavers—Taylors*, &c.

EAGLE.—First Order.

OWL.—First Order.

What bird is this? *Ans.* The Eagle.

Do you see its form? *Ans.* Yes.

What are the different parts?

Ans. Body, wings, bill or beak, thighs, legs, claws or talons, tail, eyes, tongue, neck.

What are the upper and lower bill called?

Ans. Upper and lower *mandible.*

What is the shape of the upper mandible?

Ans. Hooked.

What are its claws and beak for

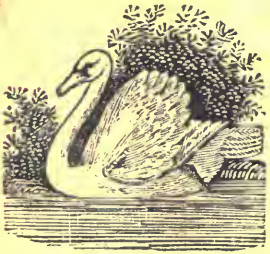
Ans. For tearing the flesh of its prey.

What is its covering? *Ans.* Feathers.

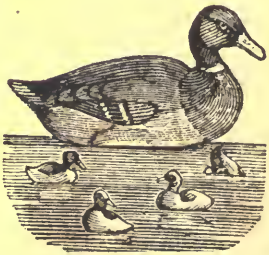
PARROT.—Second Order.

WOODPECKER.—Second Order.

WHAT bird is this? *Ans.* The Parrot.
What are its different parts?
Ans. Body, breast, wings, head, eyes, beak, legs, feet.
What is its color? *Ans.* Green.
What shape is the upper mandible? *Ans.* Hooked.
What sort of feet has it?
Ans. For perching, two toes before, and two behind.
What can the parrot be taught to do?
Ans. To imitate the human voice.



SWAN.—Third Order.



DUCK.—Third Order.

WHAT bird is this? *Ans.* A Swan.
What are its different parts?

Ans. Body, long neck, head, bill, legs, feet, wings, eyes.

Does it belong to the land or the water?

Ans. It is a water-fowl.

What kind of feet has it?

Ans. Webbed feet; that is, its toes are joined by a thin skin for swimming.

What is its color? *Ans.* White.

See! how gracefully it sits upon the water, and swims with its feet!

SNIPE.—Fourth Order.

CRANE.—Fourth Order.

PEACOCK.—Fifth Order.

PARTRIDGE.—Fifth Order.

What bird is this? *Ans.* The Peacock.

Do you see its beautiful form and plumage?

Ans. Yes.

What does plumage mean?

Ans. The covering of birds, or feathers.

What are its different parts?

Ans. Body, tail, head, legs, feet, top-knot, or crest, back, breast.

Does it live in the water?

Ans. No; it is not a water-fowl.

What kind of feet has it?

Ans. Its feet are formed for walking on the ground.

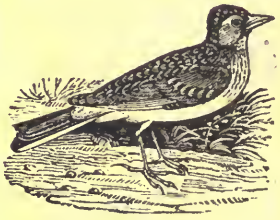
What spots are those on its tail?

Ans. They look like stars.

What is its food?

Ans. Grain, insects, &c., for which its bill is fitted.

THRUSH.—Sixth Order.



LARK.—Sixth Order.

THIRD SERIES.

FISHES.

GENERAL PREPARATORY INFORMATION.

THE third great class of the animal kingdom is that embracing the *Pices* or *Fishes*, the study of which is called *Ichthyology*.

Of Fishes there are *five orders*, which are distinguished from each other by the *number* and situation of their *fins*.

The *fins* of Fishes furnish a hint for dividing them into *orders*, as do the teeth and claws of quadrupeds, and the beaks and talons of birds. The fins are thus named; *pectoral*, behind the gills; *ventral*, beneath the body; *dorsal*, or back fin: *caudal*, or tail fin; *anal fin*, that under the body, near the tail.

The five orders are named as follows: *apodes*, *jugulares*, *thoracici*, *abdominales* and *cartilaginous*.

The *apodes*, which constitute the first order, are so called, because *destitute* of fins, as the Eel.

The second order has the ventral fin forward under the *throat*, and hence called *jugulares*.

The third order consists of such fishes as have the ventral fin beneath the breast fin, and are hence called *thoracici*.

The fourth order have the *ventral* fin behind the pectoral, and beneath the abdomen, and are hence called *abdominales*.

The fifth order, from the circumstance of having cartilage instead of bones, are called *cartilaginous* fishes.

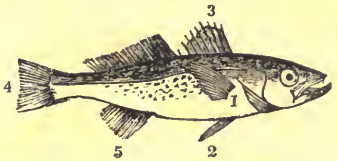
DIRECTION.

Let the children have their attention directed to these objects, until they can readily distinguish them from each other, and name them.

In noting the different *parts*, let the *number*, *situation* and *names* of the fins be pointed out, and the *reason* of their receiving their names.

The card should contain a sufficient number of each order, to answer the desired end of fixing the distinctions in their minds, and accurately drawn, that the first impressions may be correct.

Their shape, adapted for gliding through the water, their covering, intended to prevent the water from penetrating their bodies, their instruments of motion, and different modes of breathing, are interesting circumstances which must be dwelt upon and explained on proper occasions.



Names of fins—1 pectoral, 2 ventral, 3 dorsal, 4 caudal, 5 anal.

MACKEREL.

WHAT fish is this? *Ans.* Mackerel.
What is its form? *Ans.* Tapering and compressed.
What are the parts?
Ans. Body, head, mouth, gills, fins, tail, abdomen, scales.
What are the fins *behind* the gills called?
Ans. Pectoral.
What are those under the body? *Ans.* Ventral.
What are those on the back?
Ans. Dorsal.
What is the tail fin? *Ans.* Caudal.
What those *under* the body? *Ans.* Anal.
What are the fins for? *Ans.* To swim with.

EEL.

What is this? *Ans.* An Eel.
Do you see its shape? *Ans.* Yes.
What is it? *Ans.* Long and slender.
What are its different parts?
Ans. Head, mouth, teeth, eyes, body, fringe under the tail, skin.

Has the eel no fins?
Ans. No; only two little paddles behind its head.
Is it covered with scales?
Ans. No; its body is covered with a slimy skin.
Why are fish covered with scales and skin?
Ans. To keep the water from penetrating their bodies.

SALMON.

WHAT fish is this? *Ans.* Salmon.
What is its form? *Ans.* Tapering and compressed.
What are its parts? *Ans. Body, head, fins, tail,* &c.
Can you name the fins?
Ans. Yes; pectoral, dorsal, ventral, caudal, anal.
What is its covering? *Ans.* Scales.
What are its instruments of motion?
Ans. Fins and tail.
What is the salmon good for?
Ans. It makes an excellent dish.

STURGEON.

WHAT fish is this? *Ans.* Sturgeon.
What are its parts? *Ans. Body, head, fins, tail.*
What is its form? *Ans.* Long and tapering.
How are its fins situated? *Ans.* Near the tail.

What does its back look like?

Ans. Like a row of little knobs.

Did you ever see a sturgeon's nose?

Ans. Yes; I have seen it bounce like a ball.

FLYING FISH.

FOURTH SERIES.

REPTILES.

PREPARATORY INFORMATION.

This class is divided into four orders, viz—1 *Chelonia* or *Tortoises*—2. *Sauria* or *Lizards*—3. *Ophidia* or *Serpents*, and 4. *Batrachia*, embracing the *Toad*, *Frog*, *Salamander*, &c.

Reptiles are cold-blooded, and the circulation less perfect than the preceding.

They pass the winter in a dormant state, and propagate by means of eggs, except a few of the serpents.

They possess less intelligence, fewer faculties, and less instinct, than quadrupeds or birds.

DIRECTION.

Let the card containing reptiles be exhibited, and the children exercised upon it in tho same manner as on the previous ones, until they can distinguish them readily.

Let them be regarded first as a *whole*, and then the *parts*, and let the *names* designating these parts be made familiar.

TERRAPIN.—First Order.

What is this? *Ans.* A Terrapin.

Do you see its form? *Ans.* Yes.

What are its different parts?

Ans. Body covered with shell, head, mouth, eyes, legs, feet, claws, tail.

Do you see the figures on its shell? *Ans.* Yes.

What are they like? *Ans.* Like carved work.

Where does it live?

Ans. Both on the land and in the water: it can walk and swim: it lays eggs in the sand.

Is it good for food? *Ans.* Yes.

SEA TURTLE.—First Order.

What is this? *Ans.* A Sea Turtle.

What is its form?

Ans. Its shape is different from the terrapin, and it has fins instead of feet.

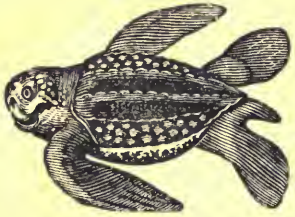
What are its parts?

Ans. Large head, body, fins or *paddles, shell, a mouth something like a parrot's, eyes,* &c.

Is the shell useful?

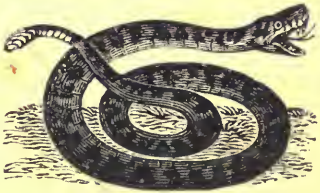
Ans. Yes, for combs; and its flesh is very good.

How is it eaten? *Ans.* Soup is made of it.



SEA TURTLE.—First Order.

ALLIGATOR.—Second Order.



RATTLESNAKE.—Third Order.

FROG.—Fourth Order.

LIZARD.—Second Order.

FIFTH SERIES.

INSECTS.

GENERAL PREPARATORY INFORMATION.

This interesting class of animated beings is called *Insecta*, and the study of them is called *Entomology*.

They are divided into *seven orders*, which distinctions turn upon the *texture* of their *wings*.

These orders are named as follows: *coleoptera*, *hemiptera*, *lepidoptera*, *neuroptera*, *hymenoptera*, *diptera*, and *aptera*.

The order *coleoptera* contains all insects of the Beetle tribe, or such as have strong horny sheaths or covers to their wings.

The order *hemiptera*, or half-winged, includes Locusts, Grasshoppers, Lantern-flies, &c. They are so named, because the upper part of the wing sheath, in this tribe, is of a leathery texture, and the lower part membraneous.

The third order, or *lepidoptera*, is so named from the fine down or powder on their wings, having the appearance of minute scales. Butterflies, Moths, &c. belong to this order.

Neuroptera or nerve-winged constitute the fourth order; their wings have a reticulated appearance. The insects belonging to this order have four wings, as the Dragon-fly.

The fifth order is called *hymenoptera;* the insects of this order have four wings, and are furnished with a sting, or a proboscis resembling one. Bees, Wasps, &c. are of this order.

Those insects possessing *two* wings, are called *diptera* from that circumstance, and include Flies, Gnats, &c. which belong to the sixth order.

The seventh and last order is named *aptera*, because destitute of wings. Spiders, Scorpions, Fleas, Mites, Lobsters, Crabs, &c. belong to this order.

DIRECTION.

Let the insect cards be furnished with a sufficient number of specimens of each order.

The children must be made familiar with their *forms* and *names*, so as to distinguish them readily, by the same means as heretofore. In attending to the minuter *parts*, the number and texture of the *wings*, and *situation* of the sting, whether in the head or tail, must be particularly noticed.

BEETLE.—First Order.

FLY.—Sixth Order.

LOBSTER.—Seventh Order

DRAGON FLY.—Fourth Order.

BEE.—Fifth Order.

BUTTERFLY.—Third Order.

SCORPION.—Seventh Order.

BEETLE.—First Order.

FLY.—Sixth Order.

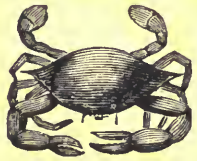
What is this? *Ans.* A Beetle.
Do you observe its form? *Ans.* Yes.
What are its parts?
Ans. Body, head, wings, legs, joints, palpi (*or feelers,*) *claws.*
How many legs has it? *Ans.* Six.
How many joints to each leg? *Ans.* Three.
What does it feed upon? *Ans.* The leaves of plants.
Has the Beetle covers to his wings?
Ans. Yes; and belongs to the order *Coleoptera.*

BEE.—Fifth Order.

DRAGON FLY.—Fourth Order.

What insect is this? *Ans.* A Bee.
Do you see its form? *Ans.* Yes.
What are its different parts?
Ans. Body, rings, head, palpi, wings, legs, sting, eyes.

What is the form of its body? *Ans.* Oval.
Is the sting in the head or tail? *Ans.* In the tail.
What number of legs has the bee? *Ans.* Six.
Where do they live? *Ans.* In hives.
What do they store up? *Ans.* Wax and honey.
Where do they put the honey?
Ans. In little cells of wax.



CRAB.—Seventh Order.

SCORPION.—Seventh Order.

What is this? *Ans.* A Crab.
Look at its form. What are its parts?
Ans. Body, pincers or *claws, legs, paddles, mouth, eyes.*
What is its form?
Ans. Swelled in the middle, and at each end tapering to a sharp point.
What are its pincers for?
Ans. For defence, and to seize its food.
What is its number of legs? *Ans.* Six.
What are its paddles for? *Ans.* For swimming.
What is its food? *Ans.* Various.

BUTTERFLY.—Third Order.

LOBSTER.—Seventh Order.

What is this? *Ans.* A Butterfly.

What are its parts?
Ans. Body, wings, legs, head, palpi, eyes, &c.
What number of wings and legs?
Ans. Four wings and six legs.
What is their color? *Ans.* Very various.
What does it feed upon? *Ans.* Plants.
What has it on its wings?
Ans. Scales or feathers, which look like fine powder.
What is its order? *Ans.* Lepidoptera.

SIXTH SERIES.

VERMES, OR WORMS.

PREPARATORY INFORMATION.

THE class *vermes* is divided into *five* orders, as follows: *intestina, mollusca, testacea, zoophyta,* and *infusoria.*

Of the *intestina,* some live within other animals, some in the waters.

The second order, called *mollusca,* from a word signifying soft, are of two kinds, viz. those which are naked and furnished with *tentacula* or arms, as the limax or slug.

The other sort is called *testacea,* because covered with a hard calcareous shell, as the Oyster, Clam, Muscle.

This branch of natural history is called *Conchology.* There are more than a thousand species of shells, which, on account of their beauty and rarity, are highly prized.

Shells are separated into three divisions, viz. the *multivalve,* embracing those shells which consist of many plates; the *bivalves,* in which the two shells are joined together by a hinge, as the Oyster; and the *univalve,* comprehending those that have a regular spire. These shells form the habitation of the animal, which is soft, and hence called *mollusca.*

The fourth order, *zoophyta*, holds a place between animals and vegetables.

The *infusoria* constitute the fifth order, and are extremely minute animalcula, destitute of feelers, and generally invisible to the naked eye.

DIRECTION.

A small collection of shells, arranged according to the three general divisions above named, would be preferable to drawings.

The attention of the infants is to be directed to the objects of this class of beings, as before.

It will probably be found that at this stage of advancement, a *habit* of *attention* and *observation* will begin to appear. This habit is the primary object at this period, and much more important than the information itself.

Here exhibit a BIVALVE SHELL to the children.

WHAT is this? *Ans.* A shell.

How many valves has it? *Ans.* Two.

What are its parts?

Ans. Its valves, hinge, edges, inner surface, outer surface, its grooves on the outside, &c. *base, aperture.*

Which is the hinge, grooves (or striæ), base, apex, &c.?

Of how many parts does a shell-fish consist?

Ans. Two; the soft mulluscous animal and its shell.

What are the hard shells called?

Ans. Testaceous, such as the oyster, clam, &c.

What are the shells of crabs and lobsters called?

Ans. Crustaceous, consisting of a thin crust.

Are all shells *bivalves*?

Ans. No: some have but one shell, and are called *univalve;* some are called *multivalves.*

Are all univalves alike?

Ans. No; some are simple, spiral, or turbinated, discoid, flattened or turreted, &c.

SEVENTH SERIES.

COMPARISON.

When the child shall have become familiar with the foregoing divisions of the animal kingdom, the next exercise which presents itself in order is that of comparison.

In comparisons we first note *differences*, and next *analogies* or *resemblances*.

We will first compare those animals that possess obvious points of difference, proceeding to those which are less obvious, for the purpose of bringing into exercise the faculty of *discrimination*.

For this purpose, let such animals be selected as belong—

First, to different *classes*.
Second, those of different *orders*.
Third, those of different *genera*.
Fourth, those of different *species*.

For example, compare *quadrupeds* with *birds*. The differences will turn upon the number of *feet*, the *form*, *covering*, *mouth*, *means of defence*, *food*, &c.

EXAMPLE FIRST.

COW.

PARTRIDGE.

A particular exemplification of *comparison* between animals of different *classes*.

In what do *quadrupeds* and *birds* differ?

Ans. They differ in the number of their feet; one having *four*, the other *two*.

What does *quadruped* mean?

Ans. A four-footed animal.

What is an animal with *two feet* called?

Ans. A *biped.*

Do you see any difference in the form of their feet?

Ans. Yes; the feet of beasts are formed for walking on the ground, those of birds for perching on branches of trees or swimming.

What other difference do you perceive?

Ans. They differ in the *covering* of their bodies; quadrupeds have hair or wool, birds have feathers.

What is this covering for? *Ans.* To keep them warm.

Why are birds covered with feathers?

Ans. Because they are both warm and *light*, suited to the air.

Does the *form* of birds differ from that of quadrupeds?

Ans. Yes; the form of birds is tapering before and behind, the better to pass through the air.

Do you notice any other difference?

Ans. Yes; their *mouth* is different: beasts have a large mouth and teeth, birds have a bill or beak.

Can you give any reason for this difference?

Ans. Beasts live on grass, grain and flesh, but birds live on seeds, insects, &c.: thus their food is different.

Are their instruments of *motion* alike?

Ans. No; beasts have legs for motion, birds have wings.

Are the *sounds* which they make different?

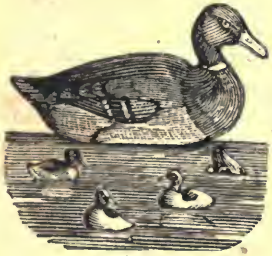
Ans. Yes; they differ very much, but the note or sound of birds is generally very agreeable.

Do beasts and birds *resemble* each other in any thing?

Ans. Yes; they both have the power of motion, have the same number of senses, and both have a tender affection for their young.

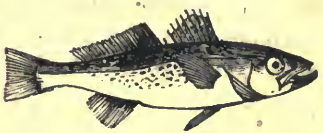
EXAMPLE SECOND.

COMPARISON OF BIRDS WITH FISHES.



DUCK.

SWORD-FISH.



MACKEREL.

Compare birds with fishes, as to form, size, covering, instruments of motion, food, &c.

WHAT is the form or shape of fishes?

Ans. More various than that of birds; some being flat, some round, some long and slender, but all suited for making their way through the water.

How do they compare with birds as to size?

Ans. Some fishes are very small, and others very large.

Is their covering different?

Ans. Yes; some fishes are covered with scales, and some with skin, which prevents the water from penetrating their bodies.

How do their instruments of motion differ?

Ans. They differ from those of birds by being more numerous, and in being placed on different parts of their bodies: they are called fins.

Do they move as swiftly as birds?

Ans. Some fishes swim very swiftly, but do not move so fast as birds.

How does their food differ?

Ans. Some fishes feed on the smaller fishes, and others live on sea plants, insects, and such nourishment as the waters afford.

Are there any points of resemblance?

Ans. Yes; birds and fishes both have the power of motion—both are furnished with instruments for that purpose—both are furnished with the same number of senses, and are equally fitted for their respective elements.

EXAMPLE THIRD.

COMPARE BIRDS WITH INSECTS

WOODPECKER.

DRAGON-FLY.

How do insects differ from the feathered race?

Ans. They differ in the texture of their wings, in size, in the number of legs, &c.

Have any insects more than two wings?

Ans. Some have two, some four; and some of these

differ from the wings of birds, by having a horny sheath to protect them.

Have all insects the same means of defence?

Ans. Some insects are furnished with a sting, in which they differ from birds.

Where is the sting placed?

Ans. Some insects carry their sting in the head, as the common fly; others in the tail, as the bee and hornet.

Do they differ from birds in size?

Ans. Yes; the size as well as shape of insects is much more various than that of birds.

In what do they resemble each other?

Ans. In ingenuity—in their power of motion—in powers of sensation—in their food, some feeding on others, some feeding on plants, and both being oviparous, that is, hatched from an egg.

HAWK.

BUTTERFLY.

DIRECTION.

These examples may serve as specimens of the mode of conducting these comparisons. The nature and extent of the questions will of course depend upon the age and capacity of the child: of this the teacher must judge, never losing sight of the principle of *adapting* the questions to the circumstances of the case.

DIFFERENT ORDERS.

LESSON FOURTH.

COMPARE QUADRUPEDS OF DIFFERENT ORDERS.

Note differences and resemblances as in the preceding examples.

They *differ*, 1. In *form*—2. In their *feet*—3. In the structure of their *teeth*—4. Shape of the *head*—5. Formation of the *ears* and *tail*.

They resemble each other, 1. In their *covering*—2. Number of *legs*—3. Number of organs of *sense*—4. In their *food*.

HORSE. COW.

Compare the *Horse*, (order pachydermata) with the *Cow*, (order ruminantia).

In what do the horse and cow differ?

Ans. In their form; the body of the cow is more bulky, and not so handsome as that of the horse.

In what else do they differ?

Ans. In the shape of the head, ears, situation of the eyes. The cow has horns, too, and the horse none.

Are their feet and tail different?

Ans. Yes; the horse has solid hoofs, and the cow cloven; a bushy tail, and the cow a long tail and bushy towards the end.

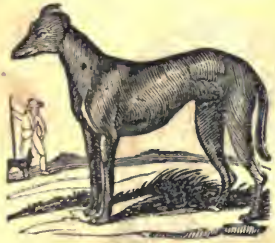
Are their teeth alike?

Ans. No; the cow has no cutting-teeth in the upper jaw, but the horse has blunt fore-teeth in both jaws.

In what do they resemble each other?

Ans. In their covering, legs, senses and food.

LESSON FIFTH.



GREYHOUND.

GUINEA-PIG.

Compare the *Dog*, (order carnivora) with the *Guinea-Pig*, (order rodentia).

In what do the dog and guinea-pig differ?

Ans. In the form of their bodies, in their feet, in their teeth, shape of the head, ears, &c.

How do their teeth differ?

Ans. The dog has pointed conical teeth; but the guinea-pig has two cutting-teeth in each jaw, like the squirrel.

Are their legs and feet alike?

Ans. No; the dog's legs are longer, and he has blunt claws.

Do they live upon the same kind of food?

Ans. No; the dog is carnivorous, but the guinea-pig lives on vegetables.

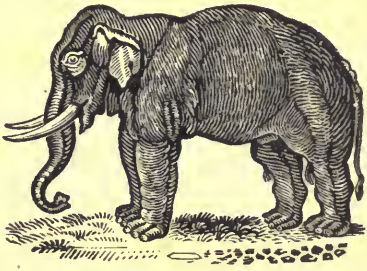
Do they resemble each other in any thing?

Ans. Yes; in their covering, number of legs, and organs of sense.

LESSON FIFTH.

Mark *differences* and analogies as before. The differences will turn upon the *size*, *form*, structure of the *head*, *mouth*, *teeth*, *food*, *feet*, &c.

Analogies.—Both quadrupeds are covered with *hair*, and live in the same *climate*.



ELEPHANT.

TIGER.

Compare the *Elephant*, (order pachydermata) with the royal *Tiger* of Bengal, (order carnivora).

In what do these animals differ?

Ans. In size, form, structure of the head, mouth, teeth.

Which has the most bulky body?

Ans. The elephant: the tiger's is long, and more slender.

How do their heads differ?

Ans. The tiger's head is like that of the cat; but the elephant's is lengthened into a snout or proboscis.

Do their teeth and claws differ?

Ans. Yes; the elephant has no fore-teeth in either jaw, but the tiger has many sharp teeth like the cat.

Is their food alike?

Ans. No; the one eats flesh, the other vegetables. They are both covered with hair, and live in warm climates.

LESSON SIXTH.

RHINOCEROS.

DEER.

Compare the *Rhinoceros*, (order pachydermata) with the *Deer*, (order ruminantia.)

With reference to the last particulars.

In what do these animals differ?

Ans. In size, form, shape of the head, teeth, feet, &c

Which has the most graceful form?

Ans. The deer.

In what do their feet differ?

Ans. The hoofs of the deer are cloven.

Which is formed for running? *Ans.* The deer.

Which is the strongest? *Ans.* The rhinoceros.

Do their horns differ?

Ans. Yes; the deer has branching horns on his head, but the other a single horn on the nose.

Are their teeth different?

Ans. Yes; the deer has no fore-teeth in the upper jaw, the other none in either.

LESSON SEVENTH.

CAT.

RABBIT.

Compare the *Cat*, (order carnivora) with the *Rabbit*, (order rodentia.)

COMPARE them.

Ans. They are different in the shape of their body, ears, tail, eyes, shape of the head, teeth and feet.

How do the ears and tail differ?

Ans. The rabbit has long ears and a short tail, the cat short ears and long tail.

Are their eyes different?

Ans. Yes; the rabbit's eyes stand out on the side of the head, the cat's are placed in front.

How do their teeth differ?

Ans. The cat has sharp teeth, the rabbit two cutting teeth in each jaw.

In what do they resemble each other?

Ans. In their senses, covering, legs, &c.

LESSON EIGHTH.

SHEEP.

WOLF.

Compare the *Sheep*, (order ruminantia) with the *Wolf* (order carnivora.)

In what do they resemble each other?

Ans. In the number of legs, in the organs of sense.

In what do they differ?

Ans. In form, in their teeth, claws, feet, covering, &c.

How do their teeth and claws differ?

Ans. The Wolf has teeth and claws like a dog, the sheep has no cutting-teeth in the upper jaw, and cloven hoofs.

How does their covering differ?

Ans. The one is covered with wool, the other with coarse hair.

Is their food the same?

Ans. No; the wolf eats flesh, the sheep eats grass, and chews the cud.

LESSON NINTH.

HOG.

GOAT.

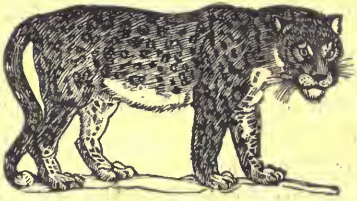
Compare the *Hog*, (order pachydermata), with the *Goat*, (order ruminantia.)

DIFFERENT GENERA.

COMPARE QUADRUPEDS OF DIFFERENT GENERA.

LESSON TENTH.

BEAR.



JAGUAR.

Compare the *Bear* with the *Jaguar*, different genera of the order feræ.—Differences and resemblances.

In what do these animals agree?

Ans. In their covering, in their teeth, claws, organs of sense, food, &c.

What sort of teeth and claws have they?

Ans. Both sharp, for tearing their prey.

What is their food? *Ans.* Flesh.

In what do they differ?

Ans. In the form of their bodies, shape of the head and legs, length of the tail, and form of the feet.

Which is the most swift and active?

Ans. The Jaguar.

LESSON ELEVENTH.

HARE.

SQUIRREL.

Compare the *Hare* with the *Squirrel*, different genera of the order rodentia.—Differences and resemblances.

Do these animals differ in any thing?

Ans. Yes; in their form, tail, feet, ears.

Which is formed for climbing?

Ans. The squirrel for climbing, and the hare for running.

Describe the tail of each.

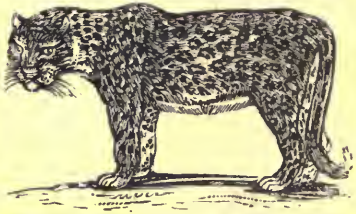
The squirrel's is long and bushy, turning up over the body like an umbrella; the hare's is short, like that of the rabbit.

In what do they agree?

Ans. In their teeth, both having two cutting-teeth in each jaw, in their coat, and in both being very timid.

LESSON TWELFTH.

LION.



LEOPARD.

Compare the *Lion* with the *Leopard*, different genera of the order carnivora.

In what do these differ?

Ans. In the form of the body, shape of the head, tail, color.

What has the lion on his head and neck?

Ans. A mane.

How do the head and tail differ?

Ans. The lion's has a tuft at the end; the leopard's is like that of the cat.

How does the color differ?

Ans. The leopard is spotted.

In what are they alike?

Ans. In their teeth and claws, in their food, both being carnivorous.

LESSON THIRTEENTH.

CAMEL.

SHEEP.

Compare the *Camel* with the *Sheep*, different genera of the order ruminantia.—Differences and resemblances.

LESSON FOURTEENTH.

ZEBRA.

HOG.

Compare the *Zebra* with the *Hog*, different genera of the order pachydermata.

STAG.

BEAVER.

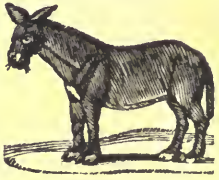
Compare the *Stag* with the *Beaver*.

DIFFERENT SPECIES.

COMPARE QUADRUPEDS OF DIFFERENT SPECIES.

LESSON FIFTEENTH.

ZEBRA.



ASS.

Compare the *Zebra* with the *Ass*, different species of the same genus, (Equus.)

LET us compare these animals.

How do they differ?

Ans. In the form of the body, shape of the neck, legs, stripes, head, ears, &c.

Which is the more graceful? *Ans.* The Zebra.

In what do they resemble each other?

Ans. In their teeth, hoofs, covering, food.

Describe their teeth.

Ans. They both have blunt fore-teeth in each jaw.

Are their hoofs cloven?

Ans. No; they are solid, like those of the horse. They both feed upon vegetables.

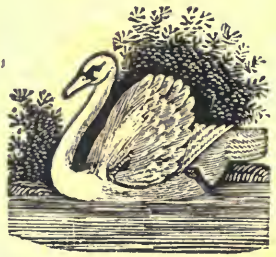
BIRDS.

COMPARISONS CONTINUED.

COMPARE BIRDS OF DIFFERENT ORDERS.

LESSON SIXTEENTH.

EAGLE.



SWAN.

The *Eagle*, (order accipitres), with the *Swan*, (order anseres.) Mark differences and resemblance as before, as to *size, form, color, beak, feet*, &c.

In what do these birds differ?

Ans. In form, color, wings, bill, feet, neck, &c.

Which has the largest wings? *Ans.* The eagle.

How do their feet differ?

Ans. The eagle has strong claws or talons, the swan has webbed feet for swimming.

Are their beaks alike?

Ans. No; the eagle's beak is hooked, but the swan's is flat.

Do they live in the same element?

Ans. No; the swan is a water-fowl, the eagle is not.

In what are they alike?

Ans. Both are covered with feathers, both have wings, organs of sense, &c.

LESSON SEVENTEENTH.

PARROT.

PIGEON.

Compare the *Parrot*, (order picæ), with the *Pigeon*, (order passeres.)

In what do these differ?

Ans. In shape, color, bill, feet, tail, &c.

What is their color?

Ans. The parrot is green, the pigeon lead color; but tame pigeons are of various colors.

How do their bills differ?

Ans. The parrot's is hooked, the pigeon's not.

Are their feet alike?

Ans. No; the parrot's are formed for perching, climbing, &c.; the pigeon's, for walking and perching.

Which can be taught to speak? *Ans.* The parrot.

In what do they agree?

Ans. In covering, wings, and organs of sense.

LESSON EIGHTEENTH.

WOODPECKER.

THRUSH.

Compare the *Woodpecker*, (order scansores), with the *Thrush*, (order passeres.)

BIRDS OF DIFFERENT GENERA.

LESSON NINETEENTH.

OSTRICH.

COCK.

Compare the *Ostrich*, (grallæ), with the *Cock*, (gallinæ.)

In what do these differ?

Ans. In form, color, tail, head, neck, legs, feet, bill.

Which is the larger? *Ans.* The ostrich.

What has the cock on his head?

Ans. A comb, and wattles underneath.

Is the cock bold or timid? *Ans.* Very bold.

What do we get from the ostrich?

Ans. Beautiful feathers.

What sort of wings has the ostrich?

Ans. Very short; they assist him in running.

What are on the legs of the cock? *Ans.* Spurs.

LESSON TWENTIETH.

OWL.

VULTURE.

Compare the *Owl* with the *Vulture*, different genera of the order accipitres.

In what do these birds differ?

Ans. In size, form, color, head, beak, &c.

Describe the vulture's neck.

Ans. It is partly naked of feathers, and has a kind of ruff around its neck.

Has the owl ears?

Ans. It has two feathers resembling ears on each side of its head?

What are the head and face of the owl like?

Ans. Like those of a cat.

What is their food?

Ans. The vulture feeds on carrion, the owl on mice, birds, and young rabbits.

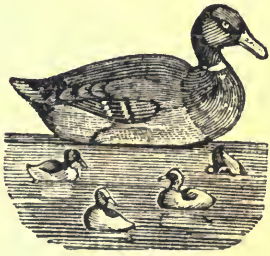
PEACOCK.

PARTRIDGE.

Compare the *Peacock* with the *Partridge* different genera of the order gallinæ.

LESSON TWENTY-FIRST.

PENGUIN.



DUCK.

Compare the *Duck* with the *Penguin*, different genera of the order anseres.

In what do these birds resemble each other?

Ans. They are both web-footed, and both are water-fowl.

In what do they differ?

Ans. In form, length of wings, and legs, shape of the bill, &c.

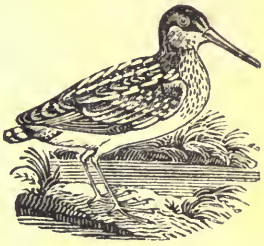
What do Penguins resemble at a distance?

Ans. They look like little children with white aprons.

What are young ducks called? *Ans.* Ducklings.

LESSON TWENTY-SECOND.

CRANE.



SNIPE.

Compare the *Crane* with the *Snipe*, different genera of the order grallæ.

COMPARE these birds.

In what do they differ?

Ans. In form, size, color, legs, bill, and tail.

Which has the longest legs and bill?

Ans. The crane has the longest legs, but the snipe the longest bill.

How do their necks differ?

Ans. The neck of the snipe is short; that of the crane long, with a profusion of feathers about the tail.

What places do they inhabit?

Ans. Watery situations.

LESSON TWENTY-THIRD.

QUAIL.

BIRD OF PARADISE.

Compare the *Bird of Paradise*, (order passeres), with the *Partridge*, (order gallinæ.)

In what do these birds differ?

Ans. In size, form, color, bill, wings, tail, &c. The partridge has a very plain dress, but the bird of paradise has a very rich plumage. It has two long threads or hairs growing out of its wings, and its tail is composed of many long feathers of brilliant colors. It is a native of the east.

DIRECTION.

The exercise of comparison may be extended to the other classes of the animal kingdom, viz: *Fishes*, *Insects*, &c.

With regard to Fishes, the comparisons will have reference to the difference of *form* and *size*, *fins*, their *number*, situation, food, &c.

As to Insects, the differences and analogies will turn upon the *wings*, their *number*, *texture*, situation of the sting, and other striking circumstances.

EIGHTH SERIES.

VEGETABLE KINGDOM.

PREPARATORY OBSERVATIONS.

A SCIENTIFIC classification of plants would as yet be premature; the object, at present, being to present the external visible Forms of things, with the view of *naming* and *distinguishing* them from each other, and of noting the different parts.

For this purpose, let the most useful *forest-trees*, *fruit-trees*, *flowers*, with their minute parts, *roots*, *leaves*, &c., be introduced to their notice, and exercises founded on them, similar to those on the animal kingdom.

FOREST TREES.

CARD NO. 1.

THIS card will embrace the most common and useful forest trees, the *form* and *leaves* drawn and colored with sufficient truth and accuracy to distinguish them with facility.

The *Oak*, *Fir*, *Maple*, *Locust*, *Chestnut*, *Beach*, *Elm*, *Mulberry*, *Walnut*, *Hickory*, *Sycamore*, *Sugar-tree*, *Poplar*, &c.

PREPARATORY EXERCISES ON THE VEGETABLE KINGDOM.

WHAT are the different parts of trees, shrubs, &c.?

Ans. The *root*, *trunk*, *branches*, *leaves*, *flowers*, and *fruit*.

What are the roots for?

Ans. To fix the tree firmly in the ground, and to imbibe nourishment therefrom.

What is the trunk for?

Ans. To support the spreading branches; and these in their turn support the leaves and fruit.

What is the outside of the trunk called?

Ans. The bark, which covers and protects it as skin covers an animal. The bark of some trees is rough, some smooth, and some thin and transparent.

What are the forms of trees?

Ans. Some are spreading, others taper or conical, others tall and slender.

FRUIT TREES.

CARD NO. 2.

This card will contain the *Apple-tree, Pear-tree, Peach-tree, Plum-tree, Quince-tree, Cherry-tree, Orange-tree, Coffee-tree, Tea-tree,* &c.

FLOWERS.

CARD NO. 3.

The most beautiful flowers, accurately colored from nature, will form a class of objects peculiarly attractive. *Rose, Lily, Pink, Tulip, Violet, &c.*

CARD NO. 4.

The different *parts* of the flower, especially those parts on which the *classification* turns. As the *Calyx, Corolla,*

Nectary, *Stamens*, *Pistils*, *Anther*, *Pollen*, *Germ*, *Style*, *Stigma*.

Let these different parts be pointed out both on the card and from the flowers themselves.

Do you see these flowers? *Ans.* Yes.

How do they differ?

Ans. They differ in color, in form, in the number of petals.

What are petals?

Ans. They are the leaves of the flower.

What are all the colored leaves of a flower called?

Ans. The *corolla*, which means a crown.

What is that of a green appearance under the *corolla* called?

Ans. The *calyx* or cup, because it holds the flower like a little cup.

What are those things inside of the flower called?

Ans. The middle one is called the *pistil*, and those around it the *stamens;* the little threads that support them are called *filaments.*

What is that part called out of which the filaments grow?

Ans. The *nectary*, or the part which contains the honey. The fine dust on the stamens is called *pollen.*

ROOTS.

CARD NO. 5.

On this card will be exhibited the Roots of plants, which receive different names, expressive of their *forms*; as the *Branching-roots*, *Spindle-shaped roots*, *Fibrous-roots*, *Bulbous-roots*, *Granulated-roots*, *Creeping-roots*, and *Tuberous-roots.*

What are the names given to different sorts of roots?

Ans. Some are called *branching roots*, like those of forest and fruit trees; some are *spindle-shape*, as the beet and radish; some *fibrous*, as the grasses; some *bulbous*, as the hyacinth, lily, tulip, &c.; some *tuberous*, as the potato, &c.

What are the roots of plants furnished with?

Ans. With little mouths at their ends, to suck up juices and moisture from the ground.

What causes these little mouths to open?

Ans. Heat; thus they begin to vegetate and bud as soon as the sun in the spring warms them.

How does cold affect them?

Ans. It causes these little mouths to close, and the leaves fall to the ground.

LEAVES.

CARD NO. 6.

The Leaves of trees and plants existing in such variety, will afford a good exercise on the *names* expressive of their Forms; such as the *orbicular*, *ovate*, *oval*, *oblong*, *heart-shaped*, *palmate*, &c.

Is the *form* of leaves very various?

Ans. There is a great variety of forms, with different names to express them.

Will not those names apply to other things as well as to leaves?

Ans. Yes; and therefore it will be very useful to learn them. They are as follows: orbicular, ovate, oval, oblong, cordate (heart-shaped), kidney-form, lanceolate, linear, arrow-form, halbert-form, guitar-form, lobed, palmate, wedge-form, &c.

Do you see the veins running through the leaf?

Ans. Yes; a large one through the middle, and smaller ones branching off from it every way.

What are these veins for?

Ans. To convey the sap or juice to every part.

Is the upper side different from the under?

Ans. Yes; the upper is smooth and green, the lower side is rough and not so green.

FRUIT.

Is the fruit as various as the leaves and flowers?

Ans. Yes; fruits differ very much, as to *size*, *form*, *covering*, and *substance*; some are large, others small; the form of some is oval, others round, and some conical; some fruits are covered with a hard shell, as nuts, acorns, &c.; some with a thin skin, as the apple, pear, peach, plum; some are pulpy, as the cherry;

some fleshy, as the apple and pear; some have a hard stone covered with flesh, as the peach, plum, &c.

What are the different parts of an apple?

Ans. First, a thin skin on the outside; under that the flesh, which is juicy; in the middle are the seeds, of a brown color, inclosed in little membranous cells.

NINTH SERIES.

MINERAL KINGDOM.

GENERAL PREPARATORY INFORMATION.

A SMALL collection of Minerals will be necessary to afford the children an opportunity of becoming acquainted with their general external characters, and more obvious *uses*.

There are *four* great classes of Minerals, under which all the specimens are to be arranged.

1. EARTHY MINERALS.

In their three great divisions of *Argillaceous*, *Silicious*, and *Calcareous*, as clay in all its varieties, Gypsum, Chalk, Flint, Millstone, Sand, Alabaster, Crystals, Precious Stones, Cornelians, Jasper, Topazes, Sapphires, Rubies, Emeralds, and Diamonds.

2. SALINE MINERALS.

Saline Minerals are such as are of a pungent taste, heavier than the preceding, and partly transparent; such as Common Salt, Alum, Nitre or Saltpetre, and Borax.

3. INFLAMMABLE MINERALS.

Inflammable Minerals are distinguished from the foregoing, by being light, brittle, opaque, and never feeling cold; such as Coals, Sulphur, Black-lead, and Amber.

4. METALLIC MINERALS.

Metallic Minerals are distinguished from all the other classes, by being heavier, opaque, cold, ductile, or capable of being drawn out into wire, and malleable, capable of being spread out under the hammer. Metals of this class consist of Gold, Silver, Platina, Copper, Iron, Lead, Tin, &c.

DIRECTION.

In exercising the children on Minerals, the circumstances most important to be considered, at present, are their external differences, such as *weight*, *color*, *texture*, *opacity*, *brightness*, *transparency*, &c. &c.

A reference to their important and various *uses* may, from time to time, be referred to by the teacher, with the view of awakening attention.

For example, the *uses* of sand, silex, &c., in the beautiful and useful article of glass.—Argile or clay, in the various useful forms of pottery, plates, cups, &c.—Lime, as mortar for building houses, plastering, &c., may be noticed as opportunity may serve.

EARTHY MINERALS.

1. ARGILLACEOUS

WHAT does Argillaceous mean?

Ans. It means clayey.

Are there different sorts of clay?

Ans. Yes; such as common clay, pipe-clay, fullers' earth, porcelain clay, &c.

What is made of common clay?

Ans. Bricks for building, earthen-ware, tiles, &c.

How are bricks made hard?

Ans. By burning them in a kiln.

What is earthen-ware?

Ans. That common ware made by the potter; such

as pans, cups, plates, &c.; the finer sort is called queen's-ware.

What is porcelain?

Ans. It is that fine transparent ware, called China, and Liverpool ware, and is made of the finest sort of clay.

What are tiles?

Ans. Tiles are made of clay, burnt like bricks, and used for covering houses.

2. SILICIOUS EARTH.

What are Silicious earths?

Ans. Those consisting of hard stones, such as sand, flint, millstones, crystals, precious stones, &c.

What useful material is made of Silex?

Ans. Glass is one of the most useful, millstones, &c.

Can you tell me any thing about the precious stones?

Ans. They are transparent, and of the most beautiful colors; some green, some red, yellow, blue, mottled, &c.

What do you know of the diamond?

Ans. It is clear and transparent, very hard, and forms one of the most costly ornaments. It is worn as necklaces, bracelets, rings, &c.

Where is the diamond found?

Ans. In the mines of Golconda in Hindoostan, and Brazil.

3. CALCAREOUS EARTH.

What does this mean?

Ans. Any earth that can easily be reduced to a *calx* or *powder* by burning.

What earths belong to this class?

Ans. Gypsum, chalk, lime-stone, &c.

Are these useful?

Ans. Yes; very useful, especially lime-stone.

What is its use?

Ans. It is used as a cement in building.

Will you tell me what you know about it?

Ans. First, it is a hard rock; but when burnt in a kiln, it becomes soft like chalk, and is called quick-lime; it is then mixed with water, and becomes slacked-lime; sand, and sometimes hair, is added, and it is then called mortar. It is used by the brick-layer and plasterer in building.

SALINE MINERALS.

What are they?

Ans. Common Salt, Alum, Nitre, &c.

How is common salt procured?

Ans. From salt springs, from sea water, and from mines of rock salt.

In what part of the world are these mines?

Ans. The most remarkable are in Poland.

How will you distinguish alum?

Ans. By its sour taste.

Do you know any thing of nitre?

Ans. It looks like alum, and is an ingredient in gunpowder.

3. INFLAMMABLE MINERALS.

What are they?

Ans. They are coals, sulphur, amber, &c.

Can you tell how many kinds of coals there are?

Ans. Yes; three kinds, Bituminous, Anthracite, and Charcoal.

Where is bituminous coal found?

Ans. In England, the United States, &c.

Where the Anthracite? *Ans.* In Pennsylvania.

What is charcoal? *Ans.* It is wood burnt to a coal.

What is the appearance of coals?

Ans. Bituminous coals are of a dull black, Anthracite are of a shining black.

What is the color of Sulphur?

Ans. Of a yellow color; it is a very inflammable substance.

What can you say of Amber?

Ans. It is semi-transparent, tasteless, and emits a fragrant smell.

Where is it found?

Ans. On the sea-shore, in many places; on the shores of the Baltic, at Cape Sable, and in Maryland.

METALS.

How do the metals differ from other minerals?

Ans. They are heavier, opaque, ductile, &c

What is opaque? *Ans.* Not transparent.

What are the principal metals?

Ans. Platina, Gold, Silver, Copper, Iron, Lead, &c.

Which is the most useful?

Ans. Iron; because it can be turned into steel, of which tools are made.

What is the color of each?

Ans. Platina and Silver are greyish white, gold is yellow, &c.

Where are these metals found?

Ans. In most parts of the world. Gold and Silver

are found particularly in South America, Mexico, the United States, &c.

Which of these metals are coined into money?

Ans. Gold, Silver, and Copper.

Can you name these coins?

Ans. Yes; Eagles, half-Eagles, guineas, sovereigns, &c. Silver is coined into dollars, half-dollars, quarters, eighths, &c. Copper is coined into cents and half-cents.

TENTH SERIES.

HAVING travelled through the three great kingdoms of nature, noted some of the more prominent features, and *compared* the various objects, the attention of the Infants might now be properly invited to some of the common

OBJECTS OF ART.

LESSON FIRST.

A HOUSE.

WHAT is a house? what is it for? what are the *materials* of which it is built? (or in adapted language) what is it made of? *Ans.* Stone, bricks, mortar, wood, iron, glass, paint, marble, &c.

Where does stone come from? bricks? mortar? wood? &c.

What trades are necessary to be employed?

Ans. Brick-layer, carpenter, glazier painter, stone-cutter, &c.

What are the different parts of a house?—*Ans.* Walls, roof, windows, floors, rooms, &c.

LESSON SECOND.

A SHIP.

1. Note the different parts—as the hull, the stern, prow, keel, &c.
2. The spars—as masts, yards, bowsprit, boom, top-masts, mizen-mast, main-mast, fore-mast.
3. Sails—as main-sail, main-top-sail, main-top-gallant-sail.
4. Ropes—as shrouds, halyards, cable, stays, &c.

LESSON THIRD.—ARTICLES OF CLOTHING.

To what kingdoms of nature are we indebted for our clothing?

Ans. Vegetable and animal.

What from the vegetable? *Ans.* Flax, hemp, cotton.

What from the animal? *Ans.* Wool, silk, fur, leather

What is flax? *Ans.* The fibre of a plant.

What is hemp? *Ans.* A coarser fibre of a plant.

What is cotton? *Ans.* It is the product of a plant.

Questions continued at pleasure.

What is made out of flax? *Ans.* Linen.

What of hemp? *Ans.* Ropes, sail-cloth, &c.

What of cotton? *Ans.* Muslin, calico, chintz, &c.

What of wool?

Ans. Broad-cloth, stockings, blankets, &c.

What of silk?

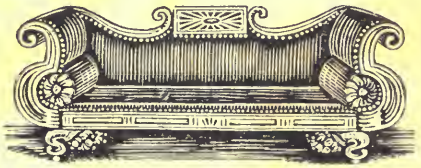
Ans. Silk dresses, silk handkerchiefs, &c.

What of fur? *Ans.* Hats, muffs, tippets, &c.

What of skins?

Ans. Leather for shoes, trunks, saddles, bridles, &c. &c.

LESSON FOURTH.



SOFA.

WHAT is this? *Ans.* A Sofa.

What are its different parts?

Ans. Its frame, consisting of back, ends, seat, feet, castors, &c.

Of what materials is it made?

Ans. Pine, mahogany, hair, wool or moss for stuffing, hair-cloth, brass-headed nails, brass castors, &c.

By whom is it made? *Ans.* By the cabinet-maker.

What are its uses?

Ans. As a parlor ornament, and also a convenient, pleasant seat.

From what kingdoms of nature are the materials?

Ans. From all the kingdoms.

Which from the animal?—Which from the vegetable? Which from the mineral?

LESSON FIFTH.

FURNITURE.

WHAT is the furniture of a house?

Ans. 1. Of the parlor—Tables, chairs, piano, carpet, rug, grate, pictures, looking-glasses, &c.

From what kingdom of nature do they come?

Ans. The tables are made of wood, that is the vegetable kingdom.

And the others?—[notice each.]

2. Of the chambers?

Bedstead, beds, drawers, wash-stand, glass, &c.

Where do these come from?

Ans. The bedstead is wood—beds are made of the feathers of birds—bed-clothes of cotton, wool, &c.

3. The kitchen? *Ans.* Pots, kettles, pans, plates, &c.
Where do these come from?
Ans. The mineral kingdom.

LESSON SIXTH.

COACH.

WHAT does this picture represent? *Ans.* A coach.
What are its different parts?
Ans. The body, wheels, hub, spokes, felloe, tire, springs, axle, pole, curtains, lining, seats, &c.
What are the materials?
Ans. Wood, iron, cloth, leather, paint, varnish, &c.
What kingdoms of nature?
Ans. Vegetable, animal, and mineral.
Who makes it? *Ans.* The coach-maker.
What is its use? *Ans.* To ride and travel about in.

LESSON SEVENTH.

BOOK.

WHAT is this? *Ans.* A book.

What are its parts?

Ans. Paper, leaves, cover, ink, thread, paste, letters, words.

What is the paper made of?

Ans. Rags—the cover? leather, &c.

What kingdoms of nature?

Ans. Vegetable, animal, and mineral.

What parts from the vegetable?

Ans. The rags for the paper, thread to sew the leaves.

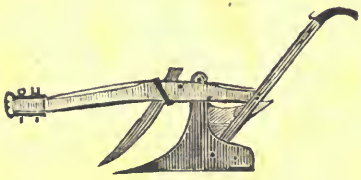
What from the animal?

Ans. The leather for the cover.

What from the mineral?

Ans. The types for the letters.

LESSON EIGHTH.



PLOW.

WHAT is this? *Ans.* A plow.

What are its parts?

Ans. The handles, beam, share, coulter.

Which are the handles, beam, &c.?

What are they made of? *Ans.* Wood and iron.

What parts are wood?—what iron?

What is the use of the plow?

Ans. To turn up the ground, and prepare it for seed.

Who makes it? Who uses it?

LESSON NINTH.—A LOOM.

WHAT is this? *Ans.* This is a loom.
What is a loom for? *Ans.* To weave cloth.
What kinds of cloth?
Ans. Cotton cloth, woollen cloth, silk, &c.
What are its parts?
Ans. The post, beam, treadles, shuttle, reed, &c.
What are these parts made of?
Ans. Of wood, reed, iron, &c.
Which is the warp?—woof or filling?

LESSON TENTH.—A STEAM-ENGINE.

WHAT is this? *Ans.* A steam-engine.
What are its parts?
Ans. The furnace, boiler, piston, wheels, &c.
Of what is it made? *Ans.* Iron, copper, and wood.
What is its use?

This series of exercises may be extended to other familiar objects at pleasure.

ELEVENTH SERIES.

ON THE SENSES.

LESSON FIRST.

WHAT are the senses?
Ans. Those instruments or organs with which we see, hear, smell, taste, and feel.

How many organs of sense have you? *Ans.* Five.

Count them. Eyes one, ears two, nose three, palate four, skin five.

In what parts of the body are they placed?

Ans. The sense of feeling or touch extends all over the body; the others are placed in the head.

What are the sensations called?

Ans. Seeing, hearing, smelling, tasting, feeling.

LESSON SECOND.

EYES.

What are the eyes for?

Ans. To see things or objects.

What qualities in things or in nature are for the eye?

Ans. Light, color, form, motion, size, distance.

LESSON THIRD.—OF COLORS.

Here let the seven original colors be shown, painted on paper, or through a prism.

What color is this? *Ans.* Violet.

And this?

Ans. Indigo, blue, green, yellow, orange, red.

How many have you named? *Ans.* Seven.

What are these called?

Ans. The seven original colors.

Repeat them again in their order.

Violet, indigo, blue, green, yellow, orange, red.

In what kingdom of nature do we see the greatest variety of these beautiful colors?

Ans. In the vegetable kingdom.

What flowers are red? *Ans.* The rose, &c.

What are blue? *Ans.* The blue-bell, &c.

What parts of vegetables are green?

Ans. The leaves of trees and plants.

The same questions may be extended to birds and minerals. Red-bird, blue-bird, &c. Coal is black, gold is yellow, silver is white, &c. The initials of the word VIBGYOR, will serve to excite their recollection.

LESSON FOURTH.—OF LIGHT.

WHERE does light come form? *Ans.* From the sun.

What sense or organ does light belong to?

Ans. The eye.

What is light for?

Ans. Light enables us to see things, their color, form, and size.

Could we not see colors without light?

Ans. No; nothing can be seen in the dark.

What words express degrees of light?

Ans. Vivid, bright, clear, faint, dusky, obscure.

OBSERVATION.—To speak of the qualities of light, such as *reflection*, *refraction*, &c., would be premature.

LESSON FIFTH.—OF THE EAR AND SOUNDS.

WHAT are the ears for? *Ans.* To hear with.

What is it that we hear? *Ans.* Sounds.

What carries (conveys) sounds to the ear?

Ans. The air.

Would there be no sound without air? *Ans.* No.

What are sweet (harmonious) sounds called?

Ans. Music.

How many kinds of music are there?

Ans. Two; vocal, made by the voice, and instrumental, made with an instrument of music.

What musical instruments are there?

Ans. The drum, organ, flute, fife, clarionet, horn, trumpet, &c.: these are called wind instruments. Violin, harp, guitar, piano, &c.: these are called stringed instruments.

What is vocal music? *Ans.* Singing.

What do you call the sounds made by different animals?

Ans. The horse neighs, the bull bellows, the cow lows, the sheep bleats, the hog grunts, the dog barks, the cat mews, rats and mice squeak, the ass brays, the lion roars, the birds sing, twitter, chirp; the frogs croak, the insects buzz.

The wind whistles, the breeze whispers, the thunder roars, the rain patters, the hail rattles, the bells toll, ring, &c.

Why does the ear stand up on each side of the head?

Ans. To catch the sounds,

Are there any persons who cannot hear?

Ans. Yes, and they are called deaf people.

What are those people that cannot speak called?

Ans. Dumb, or mutes.

LESSON SIXTH.—OF FORMS.

WHAT are the *forms* of things?
Ans. Form means shape or figure.

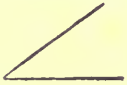
CARD OF GEOMETRICAL FIGURES.

1 Point.

2. Horizontal line.

3. Vertical Line.

ANGLES.



4. Acute.

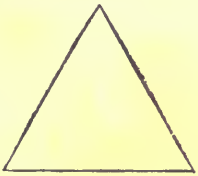
5. Right.

6. Obtuse.

7. Four right.

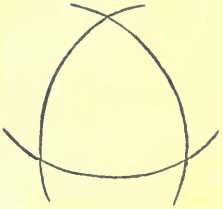
8. Curved.

TRIANGLES.



9. Equilateral.

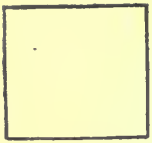
10. Scalene.



11. Curved.

12. Isosceles.

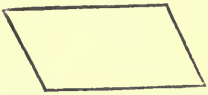
PARALLELOGRAMS.



13. Square.

14. Rhombus.

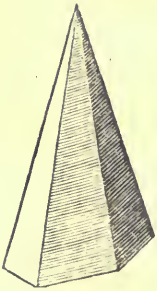
15. Oblong.



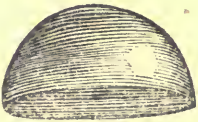
16. Rhomboid.

SOLIDS.

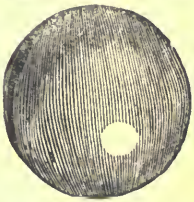
17. Cone.



18. Pyramid.

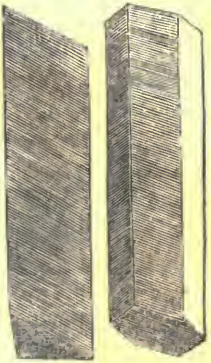


19. Hemisphere.



20. Sphere.

21. Cylinders.



22. Prisms.

NAME THE FIGURES ON THE GEOMETRICAL CARDS.

1. A POINT.
2. Horizontal line.
3. A vertical or perpendicular line.

ANGLES.

4. An acute angle.
5. A right angle.
6. An obtuse angle.
7. A right angle.
8. A curved line.

TRIANGLES.

9. An equilateral angle.
10. A scalene.
11. Curved.
12. An isosceles.

PARALLELOGRAMS.

13. A square.
14. A rhombus.
15. An oblong.
16. A rhomboid.

Opposite sides equal.

SOLIDS.

17. A cone.
18. A pyramid.
19. A hemisphere.
20. A sphere.
21. Cylinders.
22. Prisms.

——— WHAT is this? *Ans.* A horizontal line.

What does horizontal mean?

Ans. Parallel with the horizon.

What is the horizon?

Ans. The line that bounds the view. When you stand on a hill and look around you as far as you can see, the earth and sky appear to meet: that is the horizon. It is the same as level.

What is this? *Ans.* It is a perpendicular line.

What does perpendicular mean?

Ans. It means a line falling directly on another line at right angles. It also means hanging in a right line from any point towards the centre of the earth. It is the opposite of horizontal.

When I hold this stick level, what would you call it?

Ans. Horizontal.

Now I hold it upright, what is that?

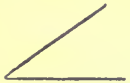
Ans. Perpendicular.

If I hold one stick level and the other upright, what then?

Ans. Then the upright stick falls directly on the level one.

Do the two sticks form a square?

Ans. They form two sides of a square, or a right angle.



ACUTE ANGLE.

OBTUSE ANGLE.

RIGHT ANGLE.

WHAT is this? *Ans.* This is an acute angle.

What does acute mean?

Ans. Sharp-pointed: here, it means any angle *less* than a right angle.

What is an obtuse angle?

Ans. Obtuse means blunt; an angle *more* than a right angle.

What is a right angle?

Ans. When the perpendicular cuts the horizontal line, as in the figure.

4 RIGHT ANGLES.

CURVED LINES.

WHAT is a curve?

Ans. A curved line is any part of a circle.

What is this? *Ans.* A circle.

What is the middle point called? *Ans.* The centre.

What is the entire curve or circle called?

Ans. The circumference.

What is a line drawn exactly through the middle called?

Ans. The diameter.

What is half this line called?

Ans. The semi-diameter.

What is half of the circle called?

Ans. A semicircle.

What is a radius?

Ans. A line drawn from the centre to the outer circle or periphery.

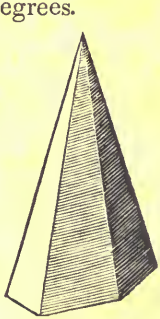
What is a quarter of a circle called?

Ans. A quadrant.

How many degrees does a circle contain?

Ans. Three hundred and sixty; half a circle contains one hundred and eighty; and a quarter of a circle, or a quadrant, contains ninety degrees.

A CONE.



A PYRAMID.

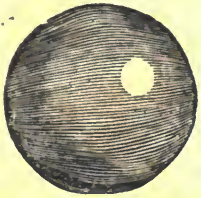
WHAT is this? *Ans.* A cone.

What is a cone?

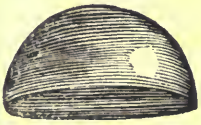
Ans. A solid body or figure, having a circle for its base, and its top terminated in a point like a sugar-loaf.

What is a pyramid?

Ans. A pyramid is a solid figure consisting of several triangles, whose bases are all in the same plane, and have a common vertex or top.



A SPHERE.



A HEMISPHERE.

WHAT is a sphere?

Ans. A globe or round ball.

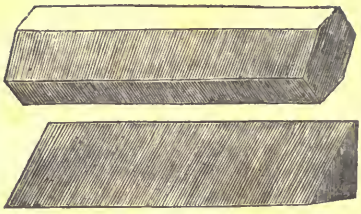
What is a hemisphere?

Ans. Half a sphere or globe.

CYLINDERS.

WHAT is a cylinder?

Ans. A long circular body of uniform diameter some are solid, some hollow.



PRISMS.

WHAT is a prism?

Ans. A solid whose bases or ends are any similar, equal, and parallel plane figures, and whose sides are parallelograms.

LESSON SIXTH.—OF MOTION.

DOES motion belong to sight?

Ans. Yes: we can see things move.

Do all things move of themselves?

Ans. Some things move of themselves, others do not, but are moved.

What are the words which express motion.

Ans. Man walks, runs, jumps, hops, dances;—the horse walks, trots, paces, racks, canters, gallops, runs;—lambs and goats skip and caper;—birds fly—fishes swim—boats and ships sail.

Has a ship any motion of itself? *Ans.* No.

What gives it motion?

Ans. The wind, steam, or tide, (current).

Has a coach any motion of itself?

Ans. No, but the horses make it move. Trees wave in the wind—waves roll, &c

LESSON SEVENTH.—OF SIZE OR DIMENSION, DISTANCES, &c. DIRECTION.

It is important to acquire a correct idea of length, breadth, distance, &c. For this purpose, take a foot-rule and explain the marks for quarters of inches, a half inch, three quarters, an inch, three inches, six inches, twelve inches, or a foot. Then proceed to a foot and a half, three feet or a yard, &c. Next allow them to measure any articles at hand, chairs, benches, floor, &c., until they can do it with facility. Next proceed to measures of *capacity*, beginning with drops of water. Teach them to count the number of drops a tea-spoon will hold, the number of tea-spoons-full in a wine-glass, or a half gill; next a gill, half pint, pint, quart, gallon, with a view of giving them an idea of those different measures in common use.

Extend the exercise to the dry measures—count the grains of corn, for instance, in a half gill, double it for a gill; half-pint, quart, quarter of a peck, half peck, peck, half bushel, bushel.

This exercise will give them an idea of *numbers*.

LESSON EIGHTH.—OF THE SENSE OF SMELL.

What is the organ of smell? *Ans.* The nose

What belongs to this sense? *Ans.* Odors.

What carries or conveys odors to the nose?

Ans. The air.

From which of the kingdoms of nature do odors come? *Ans.* The vegetable and animal kingdoms.

What vegetables smell sweetly?

Ans. Flowers, such as the rose, pink, hyacinth, daisy, lilac, honey-suckle, apple-blossom, peach-blossom, &c.

Do not fruits smell sweetly?

Ans. Yes; apples, peaches, pine-apples, melons, oranges, lemons, limes, &c.

What are the animal odors?

Ans. Musk, hartshorn, &c.

Why is the nose placed over the mouth?

Ans. That we may smell our food before we eat it, that we may not eat or drink any thing that is not good and wholesome.

LESSON NINTH.—OF TASTE.

WHAT is the organ or instrument of taste?

Ans. The tongue and palate.

What is it we taste? *Ans.* Flavors of all kinds.

What are the different flavors?

Ans. Sweet, sour, (acid), tart, bitter, brackish, saltish (saline), juicy, luscious, dry, astringent, pungent, nauseous, &c.

What things are sweet?

Ans. Sugar, honey, molasses, and some fruits.

What does sugar come from?

Ans. It is the juice of the sugar-cane.

Honey?—Molasses?

What things are sour?

Ans. Some sorts of apples are sour; lemons and limes; some are a little sour or acid, some are quite sweet; vinegar is sour.

What is vinegar? *Ans.* Wine or cider turned sour.

What is cider? What is wine?

Ans. Cider is the juice of apples, and wine the juice of the grape.

What things have a bitter taste?

Ans. Camomile, quinine, &c.

What has a saline or salt taste? *Ans.* Table salt.

What is salt good for?

Ans. It gives a pleasant relish to our food; sometimes water is brackish, or has a saltish taste.

What things have a pungent or biting taste?

Ans. Spices; such as pepper, cinnamon, allspice, cloves, nutmegs, &c.

What things are nauseous?

Ans. Physic is nauseous, because it is sickening to the taste.

What things do you like best?

Here let the children think, and name such things as occur to them.

A series of questions and conversations will naturally arise out of the articles named.

LESSON TENTH.—ON FEELING.

We have talked about seeing, hearing, smelling, and tasting; what is the other sense? *Ans.* Feeling.

Does every part of the body feel?

Ans. Yes—but especially the ends of the fingers.

What belongs to this sense?

Ans. We feel that some things are hot, other cold; some things are hard, soft, rough, smooth.

Can you think of any thing that is hot, cold, hard, soft, rough, smooth?

Ans. Yes—Fire is hot, ice is cold, minerals are hard, cotton and wool are soft, a file is rough, polished surfaces are smooth.

What is ice? what are minerals? cotton? wool? a file? polished surfaces?

When is the weather warm? *Ans.* In summer.

When cold? *Ans.* In winter.

What are the four seasons called?

Ans. Spring, summer, autumn, winter

What comes in the spring?

Ans. The pretty flowers; harvest and fruits in summer and autumn.

What keeps us warm in winter?

Ans. Fire, made of coals and wood.

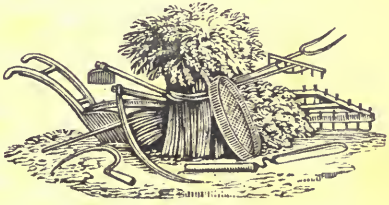
What do we call those things that burn?

Ans. Combustibles.

LESSON ELEVENTH.—GRAIN, SEEDS, SPICES, &c.

DIRECTIONS.—Let the teacher form a collection of seeds, and different sorts of grain; procure the latter in the head, ripe; such as wheat, rye, barley, oats, buckwheat, Indian-corn, rice.

After they have examined them in the head, and compared them, let them notice the grains and compare them also. After this they will be prepared to receive further instruction relative to their *qualities*, *uses*, and the *processes* they undergo.



ON CORN.

ARE all these different kinds of grain called corn?

Ans. Yes: wheat is corn; so is rye, barley, &c.

How does it grow?

Ans. The farmer sows the seed on the ground, then covers it over with earth; it soon takes root, and springs up above the surface of the ground.

After it springs up, how does it look?

Ans. Like grass, at first; but it continues to grow higher and higher, until it forms an *ear* at the top

And what is the ear?

Ans. The ear contains the seed or grains.

How does it look when it is ripe?

Ans. It turns yellow.

What then?

Ans. Then it is harvest time, and the reapers go into the field with their *sickles*, and cut it down.

What then?

Ans. They bind it into bundles or sheaves, and put it into the barn.

What is done with it next?

Ans. It is then *threshed*, that is, the ear is beat with a *flail*, until it falls out

What next?

Ans. It is then winnowed, that is, separated from the *chaff*, and the clean grain is put into bags or sacks.

And is this all?

Ans. No; it is next sent to the *mill*, to be ground into *flour*.

And what is this flour for?

Ans. To make good bread.

How is bread made?

Ans. The flour is mixed with water, yeast, salt, kneaded into dough, and put in the *oven* and baked; and this is bread.

Is there nothing else made of flour?

Ans. Yes, *cakes* of all kinds.

What are the *uses* of rye?

Ans. Rye is made into bread.

What are the uses of barley? oats? buckwheat? and Indian-corn? rice?

Ans. Barley is brewed into beer, oats are given to horses, buckwheat makes cakes, and Indian-corn makes excellent bread also.

As there are several *new terms* in this lesson, pains must be taken to have them understood.

LESSON TWELFTH.—SEEDS WHICH ARE NOT USED FOR BREAD.

ARE there any other kinds of seed not made into flour and bread?

Ans. Yes—There is flax seed, (linseed) hemp seed, cotton seed, clover seed, mustard seed, sun-flower seed, millet, lettuce seed, turnip seed—apple seed, pear seed, quince seed, melon seed, orange seed, lemon seed. These last are called pulpy fruits.

OBSERVATION.—Here let the teacher make such remarks on each of these, and put such questions as are naturally associated with the kinds of seed named.

For example—flax seed is the seed of that useful plant called flax—the capsule at the top, which contains the seed, is called the *boll*—it produces oil, much used by painters, &c. And so of the rest.

LESSON THIRTEENTH.—PULPY FRUITS

OBSERVATION.—This includes that class of fruits that have a pulpy *pericarp* or fruit, containing seeds lying among the pulp.

Name them.

The pomegranate, fig, vine, mulberry, currant, gooseberry, raspberry, strawberry, barberry, elder, bramble, cloudberry, bilberry,—pulpy fruits borne by herbaceous plants, melon, cucumber, gourds, love-apple or tomato, egg plant.

Observation.—As most of these fruits are familiar, little more will be requisite than to turn the attention of the children to their more obvious *uses*. There is little or no use made of the seed of this class of plants.

LESSON FOURTEENTH.

Drupes or Stone Fruits, having the seed inclosed in a hard nut, covered with flesh.

What fruits contain *seeds* of this kind?

Ans. The peach, nectarine, almond, apricot, plum, cherry, olive.

What are the different parts of the peach?

Ans. The skin, the flesh, which is juicy and of delicious flavor, the stone, and the seed or kernel.

What is the peach used for?

Ans. When ripe it is eaten, sometimes cut into pieces and dried in the sun; the juice is sometimes made into a liquor, and the kernel makes a pleasant bitter.

Do any of these seeds contain oil?

Ans. Yes; the almond, but especially the olive.

LESSON FIFTEENTH.

Nuts or dry Fruits, which are neither fleshy nor pulpy.

What are these?

Ans. Walnut, shellbark, hickory-nut, chestnut, hazelnut, filbert, acorn.

OBSERVATION.—Here let the children describe the parts both external and internal of each of these.

Compare them—observe the different sort of shell belonging to each, and advert to the tree each produces.

LESSON SIXTEENTH.—SPICES.

OBSERVATION.—Let the teacher form a collection of the spices in common use, such as allspice or pimento, pepper, nutmeg, mace, cinnamon, cloves, ginger.

Where do these come from?

Ans. From warm climates (the Indies).

What is their flavor?

Ans. Pungent or sharp, agreeable.

Have they any odor? *Ans.* Yes; aromatic smell.

What are they used for?

Ans. To season our food, and some of them give a pleasant flavor to drink.

What are the color and appearance of each?

Compare them.

SIMPLE IDEAS CONTINUED.

TWELFTH SERIES.

ON COMMON THINGS.

OBSERVATION.—When the *habit* of *attention* and *observation* have been acquired, every minute and ordinary object will serve for a hint or starting point for imparting instruction. Large and expensive cabinets will not be necessary, particularly in this stage of the child's advancement, when every pebble and every leaf is capable of introducing a train of useful ideas.

Much of course will depend upon the tact of the teacher, in exciting the interest of the children, and presenting these common objects in such a manner as to secure their attention.

In this stage of progression it will not be necessary to enter into minute detail, it being taken for granted, that the teacher is in possession of the requisite knowledge, insomuch that a few general hints will be amply sufficient.

DIRECTION.

Let the same plan as heretofore be pursued, in relation to the different *parts*, *qualities*, *uses*, *kingdom*, &c. to which the object belongs; and other incidental circumstances, that naturally arise out of the subject.

The objects may be divided into two classes, viz. *solids* and *liquids;* as there are many general qualities that belong to each, we shall, at present, only notice such.

The external qualities are such as belong to *form*, *color*, *smell*, *taste*, *touch*, *solidity*, *fluidity*.

EXAMPLES.

LESSON FIRST—A PEBBLE.

Its *form*, *kingdom*, *qualities*, *uses*.

WHAT is this? *Ans.* A pebble.

What is its form?

Ans. Circular, flat, irregular, &c. as the case may be.

To what kingdom does it belong? *Ans.* The mineral.

To which class of minerals? *Ans.* The earthy.

Does it consist of clay or silex?

Ans. It is a silicious mineral.

What are its external qualities?

Ans. It is hard, tasteless, pulverable, white when reduced to powder, fusible, opaque.

What are its uses?

Ans. When mixed with soda, it may be melted, and forms glass.

What are the uses of glass?

Ans. For windows, mirrors, tumblers, wine-glasses, &c.

Is it natural or artificial? *Ans.* Natural.

LESSON SECOND—A PIECE OF COAL.

Form, kingdom, qualities, uses, kinds.

WHAT is this? *Ans.* A piece of coal.

What is its form and color?

Ans. Irregular &c. glossy black.

To what kingdom does it belong?

Ans. The mineral.

What class of minerals? *Ans.* The inflammable.

Why inflammable? *Ans.* Because it will burn.

What are its qualities?

Ans. Brittle, fracture glossy, black, pulverable, opaque, heavy.

What are the different kinds?

Ans. Anthracite, which is glossy; the bituminous, and charcoal.

What are its uses?

Ans. To burn in grates, stoves, steamboats, and factories.

Is it a natural or artificial production?

Ans. Natural.

What is the difference?

Ans Things natural are found in nature, things artificial are made by art, or the hands of man.

What are those things made by hand called?

Ans. Manufactures.

LESSON THIRD—A PIECE OF BRICK.

WHAT is this? *Ans.* A piece of brick.

Is it natural or artificial?

Ans. Bricks are artificial stones.

Of what are they made?

Ans. Of clay, burned in the kiln.

What is a kiln?

Ans. A great number of bricks piled together in order to be burned hard.

Will not the fire melt the bricks?

Ans. No; fire melts some things, burns others to ashes, but it hardens clay and turns it to stone.

What is the form of a brick?

Ans. It is oblong; that is, longer than it is broad.

What are its dimensions?

Ans. It is nine inches long, four and a half broad, and two and a half thick.

Can you measure it?

Ans. Yes, I can measure it with a rule.

From what class of minerals are bricks made?

Ans. From the earthy class, called argillaceous.

What are its qualities?

Ans. It is of a reddish color, pulverable (reducible to powder) insoluble.

What are the uses?

Ans. Bricks are used for building houses.

LESSON FOURTH—A PIECE OF SLATE.

WHAT is this? *Ans.* A piece of slate.

To what kingdom does it belong?

Ans. It belongs to the class of earthy minerals.

From whence are they dug?

Ans. From places out of the ground, called quarries.

What are its external qualities?

Ans. It is brittle, of a dark color, reducible to powder.

What are its uses?

Ans. To roof houses, and for schools.

How are they used in schools?

Ans. For writing and ciphering.

LESSON FIFTH.—A PIECE OF CHALK.

WHAT is this? *Ans.* A piece of chalk.

What is its form?

Ans. Irregular, angular, square, &c.

To what kingdom does it belong

Ans. It is an earthy mineral.

What are its qualities?

Ans. It is white, easily pulverized, absorbent, light, opaque, dry, soluble.

What are its uses? *Ans.* It is used in the arts.

LESSON SIXTH.—A LUMP OF SUGAR.

WHAT is this? *Ans.* A lump of loaf-sugar.

What are its appearance and qualities?

Ans. White, sparkling, opaque, soluble, brittle, hard, sweet to the taste.

To what kingdom does it belong? *Ans.* Vegetable.

From what vegetable?

Ans. From the sugar-cane and sugar-tree.

What is brown sugar?

Ans. It is the sugar first obtained from boiling the juice of the sugar-cane, and so called from its brown color; when refined, it is called loaf-sugar.

What is its use?

Ans. To sweeten coffee, tea, tarts, pies, cakes, preserves, and sweetmeats of all sorts.

Compare a lump of sugar with a piece of chalk.

They are both white, opaque, friable, (easily crumbled); in these qualities they agree—one is sparkling, the other not; one is sweet, the other tasteless; one a mineral, the other a vegetable production.

LESSON SEVENTH—SALT.

What is this? *Ans.* Salt.

How many kinds are there?

Ans. Two, viz. rock salt, found in mines, and salt procured from salt water.

Is it a natural or artificial production?

Ans. Natural.

In what kingdom will you class it?

Ans. Mineral: it belongs to the saline class.

What are its qualities?

Ans. It is white, sparkling, granulous or composed of grains, hard, opaque, soluble, fusible, sapid, that is, has taste.

What are its uses?

Ans. To give flavor or relish to food, to preserve meat, &c.

Compare salt and sugar. In what do they differ, and in what do they agree.

Ans. They belong to different kingdoms—they differ in taste—they agree in color, and in their preservative qualities.

LESSON EIGHTH—A PIECE OF LEATHER.

WHAT is this? *Ans.* Leather.

What is leather made of?

Ans. Of the skins of animals.

What animals?

Ans. The ox, cow, horse, sheep, dog, goat, &c.

Who makes it into leather? *Ans.* The tanner.

What are the qualities of leather?

Ans. Flexible, tough, smooth, durable, opaque, odorous.

What do you mean by flexible, tough, &c.?

Ans. It is flexible because it bends easily. Tough, &c.

What are the *uses* of leather?

Ans. For shoes, gloves, saddles, reins of bridles, covering books, trunks, &c.

Can you name the different trades for making these things?

Ans. Yes; the shoemaker makes shoes, &c. the glover, saddler, &c.

LESSON NINTH—A SPONGE.

To what kingdom does the sponge belong?

Ans. To the animal; it is made by an insect.

Where is it found? *Ans.* In the sea.

What are its qualities?

Ans. It is porous, that is, full of little holes; it is absorbent, sucks up liquids; it is soft, tough, opaque, elastic or springy, flexible or easily bent, light brown color.

What are its uses?

Ans. For washing, cleansing, &c.

LESSON TENTH—INDIAN RUBBER.

To what kingdom does this belong?

Ans. To the vegetable kingdom; it comes from a tree.

What are its qualities?

Ans. It is opaque, elastic, inflammable, tough, smooth. Explain each word.

What are its uses?

Ans. To make over-shoes, balls, and to rub out pencil-marks.

LESSON ELEVENTH—GLASS.

To what kingdom does glass belong?

Ans. The mineral.

What is it made of? *Ans.* It is made of sand.

What are its qualities?

Ans. It is hard, smooth, transparent, brittle.

Why is it transparent? *Ans.* I can see through it.

Do you know any other things that are transparent?

Ans. Yes; water and air.

Why is it brittle? *Ans.* Because it easily breaks.

What are its uses?

Ans. For windows, tumblers, lamps, goblets, wine-glasses, &c.

LESSON TWELFTH—COTTON.

To what kingdom does cotton belong?

Ans. Vegetable.

What are its qualities?

Ans. It is fibrous (consisting of fine threads), white, soft, light, &c.

How does it grow?

Ans. On a plant, which bears a pod; when ripe, this pod bursts open.

What are its uses?

Ans. For cloths of various kinds, such as muslins, calico, chintz, &c.

LESSON THIRTEENTH—A PIECE OF WAX

WHAT is wax made of?

Ans. It is an animal production.

What animal makes wax? *Ans.* The Bee.

What are the qualities of wax?

Ans. It is solid, opaque, tough, fusible, stieky, yellowish, hard, odorous, smooth.

What are its uses?

Ans. To make candles and tapers, to rub furniture, to put on thread, sewing-silk, &c.

THE foregoing plan may be pursued to any extent the teacher may judge proper; as the objects are always at hand, he can be at no loss for materials. It should be remembered that the grand object at present with the child, is to acquire a habit of observation and reflexion, upon those objects which they are so apt to pass by without notice.

They must be taught how to look at things, by presenting objects under their most interesting and useful aspects. The following is a list of similar objects, each of which will furnish an interesting lesson.

Wool—an Acorn—Bark of different trees—Leaves—Fruits, Apple, Peach, Pear, Potato—Quill—Pen—Knife—Paper—Bread—Sealing Wax—Whalebone—Rice—Ivory—Horn—Lead, Iron, &c.—Water—Oil—Wine—Milk, &c. Of these liquids, the *origin*, *qualities*, *uses*, &c. are to be considered.

THIRTEENTH SERIES.

COMPLEX IDEAS.

LESSON FIRST—CLOTHING OF ANIMALS.

WHAT is the clothing of animals?

Ans. Some animals are clothed with hair, as the Horse, Cow, Dog, Goat, Deer.

Are all quadrupeds clothed with hair?

Ans. No; some are clothed with wool, as the Sheep; some with fur, as the Hare, Rabbit, Ermine, Musk-rat, &c.

Why are they clothed?

Ans. To protect them from cold and wet.

Which is the warmest of these sorts of clothing?

Ans. Fur; animals that live in very cold countries are covered with fur to keep them warm.

But is not wool warm too?

Ans. Yes; but the wool is taken from the Sheep in warm weather, and made into woollen cloths for us. Hair is not so warm a covering, and hence animals in very warm climates are thinly covered with hair.

LESSON SECOND

WHAT is the clothing of birds?

Ans. Feathers: long feathers in the wings and tail, and short feathers on the body.

Have birds no other covering?

Ans. Yes; some birds have next their skin a very soft down.

What is this for?

Ans. To keep them warm and dry.

What birds are furnished with down?

Ans. Those that inhabit cold countries, and those that are called water-fowl.

Which are the water-fowl?

Ans. The Goose, the Duck, the Swan, &c.

Of what use is the down to these?

Ans. It keeps the water from penetrating to their skin.

Why are birds covered with feathers?

Ans. Because they are light and suited to the air.

Of what use are feathers and down?

Ans. For beds.

What are quills?

Ans. They are those long feathers which grow in the tail and wings of birds.

Of what use are quills?

Ans. For pens to write with.

LESSON THIRD.

WHAT is the clothing of fishes?

Ans. Scales and skin.

What fishes are covered with scales?

Ans. Salmon, Bass, Perch, Shad, Herring, &c.

What fishes are covered with skin?

Ans. Eels, Catfish, &c.

Why are they covered with scales?

Ans. To keep the water from penetrating or soaking into their bodies.

What are these scales made of?

Ans. Of a substance very hard, tough, and semi-transparent.

In what places are fishes found?

Ans. In the sea, rivers, lakes, and ponds; called salt water and fresh water fish.

FOURTEENTH SERIES.

(COMBINATION OF SIMPLE IDEAS, CONTINUED.)

LESSON FOURTH—MEANS OF DEFENCE.

1. *Of Quadrupeds.*

HAVE most animals some means of defence?

Ans. Yes; some are furnished with very sharp *teeth* and *claws*, with which they not only *defend* themselves, but attack and kill the smaller animals.

Name some of these.

Ans. The lion, tiger, hyena, wolf, bear, fox, leopard.

What name is given to such animals?

Ans. They are called feræ or carnivorous.

What does *carnivorous* mean?

Ans. It means *flesh-eating* animals.

How does the horse defend himself?

Ans. Chiefly with his heels; he can also strike with his fore-feet, and bite.

How does the cow?

Ans. The cow and many other animals are furnished with horns.

What animals have horns?

Ans. The cow, ox, bull, goat, ram, deer, bison, ibex.

What has the elephant?

Ans. Large *tusks*, and a great *proboscis*, which is very strong.

And the rhinoceros?

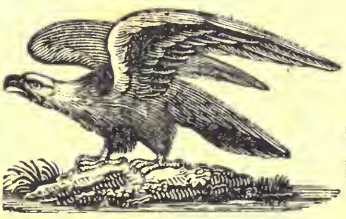
Ans. He has a strong sharp horn on the end of his snout, which is very dangerous. The boar has tusks.

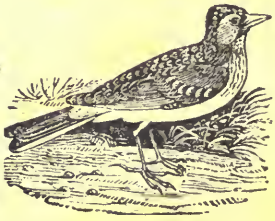
How do the smaller animals defend themselves?

Ans. Chiefly with their teeth; such as the squirrel, weasel, rat, mouse, &c.

Some animals are very timid, and by their fleetness are enabled to escape.

LESSON FIFTH—BIRDS.





Have birds any means of defence?

Ans. Birds defend themselves with their beaks or bills, their claws and wings.

The condor and the eagle have very strong beaks and talons, because, like carnivorous animals, they live on

flesh. The cock is furnished with sharp spurs, in addition to his other means of defence.

And the hen, what has she?

Ans. When she has her brood to protect, she grows very bold, and puts on such a show of courage as to frighten the larger animals away.

The wings of some birds are very strong, and are made use of to strike.

How do the goose and turkey defend themselves?

Ans. With their beaks, but chiefly by noise and a show of courage.

How is it with the smaller tribe?

Ans. The instrument with which they collect their food, serves at the same time to defend them.

LESSON SIXTH—FISHES.

Have fishes any instruments of defence?

Ans. Fishes, like beasts and birds, are furnished both with means of protection and escape.

What are they?

Ans. Some have very sharp teeth, such as the shark; some an instrument like a sword; others have an instrument like a saw, as the sword-fish and saw-fish.

What more?

Ans. Some strike very hard with their tail; but the smaller fish depend chiefly upon their swiftness to elude their enemies. The flying-fish has wings, with which he darts out of the water, and flies a considerable distance.

Can you think of any other?

Ans. Yes; the lobster and crab are furnished with strong claws or pincers; terrapins retire within their shell on the approach of danger, and the oyster and clam dwell safely within their stony walls.

How do insects defend themselves?

Ans. With their stings and claws.

Where are the stings placed?

Ans. Two-winged insects carry their sting in the head, as the fly, musquitoe, gnat, &c.; and the four-winged in the tail, as the bee, hornet, wasp, &c.

LESSON SEVENTH—INSTRUMENTS OF MOTION.

WHAT are the instruments of motion?

Ans. Quadrupeds have legs and feet for motion.

Which are the swiftest of these?

Ans. The horse, zebra, deer, fox, dog, hare, ibex, rabbit.

What have birds?

Ans. Wings, with which they fly very swiftly; and legs for running, wading, swimming, and climbing; as cranes, ducks, and parrots.

What have fishes?

Ans. Their instruments of motion are their fins and tail.

And insects?

Ans. Insects are furnished with wings and feet.

Have any more than two wings?

Ans. Yes; some have four.

What number of feet have they?

Ans. From four up to a hundred: these last are called centipedes.

LESSON EIGHTH.—DIFFERENT PARTS OF VEGETABLES THAT ARE USEFUL.

1st. *The Root.*

What vegetables are useful in this respect?

Ans. The potato, turnip, beet, parsnip, radish, yam, ginger.

What is the form of each?

Ans. Bulbous, tuberous, spindle-shaped, &c.

Which is bulbous?—tuberous?

Ans. The potato, turnip, onion, &c.

Which are spindle-shaped?

Ans. The beet, parsnip, radish.

What is their color?

Ans. The potato and turnip are white; the beet red, parsnip white, radish red, &c.

What is their use?

Ans. For food; they are very nutritious and wholesome.

Where are they cultivated?

Ans. In most parts of the world, especially in Europe and North and South America.

LESSON NINTH.

2d. *The Sap.*

WHAT vegetables are useful in this respect?

Ans. Sugar-cane, sugar-tree, beet-root, pine-tree, and the various gums.

Where does the sugar-cane grow?

Ans. In warm countries. [Here let a piece of the cane be shown.] The juice is pressed out of the cane, then put into large kettles and boiled; afterwards it is cooled, and the grains of sugar are found at the bottom.

Where does the sugar-tree grow?

Ans. In the United States. (Western.)

How do they get the sap?

Ans. They bore a hole in the trunk, then put a little hollow stick into it, and the juice runs out into wooden troughs placed to receive it.

And is this juice boiled?

Ans. Yes; just like that of the cane.

What have you to say of the beet-root?

Ans. The juice of the beet will make sugar in the same way. The juice that is left is called molasses.

What does the fir or pine produce?

Ans. The sap of the pine is called turpentine, and is made into tar and pitch, both of which are very useful.

What are their qualities?

Ans. They are very inflammable, and are used for ships, boats, and many other things. Besides these, many trees produce gums, which are useful, as gum elastic, gum arabic, &c.

What does gum elastic come from?

Ans. From a tree which grows in South America.

LESSON TENTH.

3d. *The Trunk or Wood.*

What trees are useful as timber?

Ans. The wood of almost every tree is useful, especially the timber trees.

What trees are useful?

Ans. The oak, maple, chestnut, pine, cedar, poplar, ash, gum, mahogany.

Where do these trees grow?

Ans. In most parts of the world.

For what are they useful?

Ans. Some to build ships, as the oak, locust, walnut, &c. Some for houses, as the pine, cedar, &c. Some for furniture, as mahogany, maple, rose-wood, satin-wood, &c. Some for carriages and various utensils, plows, harrows, tubs, buckets, &c. Some for dyeing, as log-wood, &c. Some for charcoal, &c. The charcoal of the willow is used, and is the best, for making gunpowder.

LESSON ELEVENTH

4th. *The Bark.*

Is the bark of vegetables of use.

Ans. Yes; such as the bark of the oak, cinnamon, sassafras, Peruvian bark, cork-tree, &c.

What is oak bark used for?

Ans. For tanning leather, because of its astringent quality. [The process of tanning may be explained in this place or not, at the option of the teacher.]

Where does cinnamon come from?

Ans. From Asia. It is the bark of a tree that grows in Ceylon, and some other places. [Let it be exhibited to the sight and taste.]

What is its use?

Ans. It is used by the confectioner and cook as an aromatic spice.

What is its taste? *Ans.* It is pungent to the taste.

What are sassafras and Peruvian bark used for?

Ans. They are medicinal—the latter is found in South America.

Where does the cork-tree grow?

Ans. In Spain, Portugal, &c.

What are its quality and uses?

Ans. It is very light and spongy, and is used for floats, stoppers, and for bottles, &c.

LESSON TWELFTH.

5th. *Leaves.*

What vegetables are useful in this particular?

Ans. The leaves of the tea-plant, rose, peppermint, sage, &c.

Is tea the leaf of a plant?

Ans. Yes; of the tea-plant, which grows in China.

Are there several different kinds of tea?

Ans. Yes; such as hyson, green-tea, black-tea, gunpowder, imperial, &c. The leaves are gathered at different stages of the growth, some when quite small, some when a little larger, and some when full grown, and hence these various names.

What are some of the qualities of tea?

Ans. It is aromatic, of pleasant flavor, and gently stimulating or enlivening.

How is it prepared for drinking?

Ans. By pouring hot water on the leaves: then it is called an infusion.

What is made of rose leaves?

Ans. Rose-water is distilled from them; peppermint, sage and balm, and the leaves of many other plants, are used for tea.

LESSON THIRTEENTH.

The Fruit.

WHAT is properly called the fruit?

Ans. That part which incloses the seed, (the pericarp.)

How do these grow?

Ans. Some on trees, as oranges, lemons, apples, peaches, pears, apricots, plums, &c. Some grow on shrubs, as gooseberries, whortleberries, blackberries, currants, &c. Some grow on vines, as melons, strawberries, cranberries, dewberries, grapes, &c.

Which of these are used for their juice as well as pulp?

Ans. The juice of the apple, and is called cider; that of the pear, and is called perry; that of the grape, currant and gooseberry, and these are called wine.

LESSON FOURTEENTH.

Of Seeds.

WHAT vegetables are valued on account of their seed?

Ans. Those which produce farina or flour, and those which yield oil.

Which are the farinaceous grains?

Ans. Wheat, rye, Indian-corn, buckwheat, oats, rice, &c.

What is made of farina or flour?

Ans. Bread and cakes.

Which yields oil?

Ans. The olive, cotton-seed, castor-oil bean, sun-flower-seed, flax-seed, &c.

What are the uses of these?

Ans. Olive oil is used for the table, cotton-seed for burning, oil-bean for medicine, &c.

What is this kind of oil called?

Ans. Vegetable oil; but there is another kind called animal oil, procured from whales and quadrupeds.

FIFTEENTH SERIES.

TRAINS OF IDEAS.

OBSERVATION.—In this series it is intended to exhibit those associations of ideas, appertaining to the *same* class, and not those which are collateral.

1. *Of a house; its structure.*

TELL me in what manner a house is built.

Ans. First the cellar is dug, the stone walls placed

for the foundation, then the brick walls, the joists for floors, the door posts, the window frames, the sashes, the floors, the fire-places, the chimneys, the roof, the spouts, the gutters, the door, the windows, the partitions, the plastered walls, the ceiling, the shutters, the steps.

2. *The Materials.*

WHAT are the materials for a house?

Stone for the foundation; brick for walls; timber for joists; boards, shingles for roof, marble for steps and mantels, glass for windows, iron for locks, brass for knobs, tin for spouts, lime for mortar, paint and putty for windows, grate for coals.

3. *The Trades employed.*

WHAT trades must be employed?

Ans. The cellar digger, the carter, the stone dealer, the lime dealer, the stone mason, the hod carrier, the brick-maker, the bricklayer, the wood cutter, the sawyer, the raftman, the lumber merchant, the carpenter, the quarrier, the marble cutter, the marble mason, the locksmith, the ironmonger, the grate maker, the glass blower, the glazier, the painter, the plasterer, the slater, the tinman.

4. *The Furniture.*

WHAT is the furniture?

Ans. The carpet, the mirrors, the book-case, the tables, the chairs, the sofa, the piano, the grate, the fire-irons, the pictures, blinds, curtains, bedstead, bed, bureau, toilet, wash-stand, crib, cradle, stove, tea-kettle, iron-pot, skillet, coffee-pot, tea-pot, cups, saucers, plates, bowls, dishes, lamps, candlesticks, oil can.

5. *Trades.*

WHAT are the trades employed in furnishing a house?

Ans. The upholsterer for carpets, curtains, beds; the carpet-weaver, the joiner, the chair-maker, the piano-maker, the looking-glass maker, the grate-maker, the lamp-maker, the iron-founder, the tinman, the potter, the cooper, the printer, the bookbinder, the print-seller, the picture-frame maker, the gilder, the blind-maker, the bell-hanger, the brass-founder, the engraver, the artist.

6. *Materials.*

WHAT are these things made of?

Ans. The carpet of wool, the tables of mahogany, the chairs of mahogany, maple, &c.; piano of pine, mahogany for the case, ivory for the keys, wire for chords, brass for handles and knobs; hair-cloth, curled hair, pine and mahogany, for sofa; chintz and silk for curtains, linen for sheets, woollen for blankets, feathers for beds, pillows, and bolsters; iron for kettles and pots, clay for earthenware, glass for lamps, gold leaf for picture-frames; pine, mahogany, and maple for bedsteads, sheet-iron for stoves.

7. *A Ship.*

Teacher. Come, let us build a ship—Well, we first lay the keel, then the timbers, the beams, the planks, the decks, the hatches, the stern-timbers, the cutwater, the hold, the cabin, pumps; next, the spars, the bowsprit, the masts, the beams, the yards, the round-top;

next, the sails, the mainsail, main-top-sail, main-top-gallant-sail, the foresail, fore-top-sail, fore-top-gallant-sail, the mizen-topsail, the mizen-top-gallant-sail, the jib, the flying-jib, staysail, studding-sail; next, the ropes, the shrouds, the halyards, the stays, the cables.

8. *The Materials.*

Now tell me the materials made use of in building (constructing) a ship.

1. Oak timber for the keel, timbers, planks, decks; pine timber for spars, such as masts, booms, yards, bowsprit; mahogany and maple, for the ornamental parts of the cabin, state-rooms, berths, &c.

2. Iron and copper for bolts, spikes, nails, and fastenings of various kinds; also for anchors, chain-cables, &c.

3. Hemp, for sails, ropes, and all kinds of cordage, cables, &c.

9. *Trades employed in Ship-building.*

Are there many trades connected with ship-building?

Ans. Yes; and I will try to name them. First, there is the wood-chopper to cut down the trees, the sawyer to saw the planks, the ship-carpenter to hew the timbers and planks, fit and fashion them together, the blacksmith to make the anchors, bolts, chain-cables, spikes, hooks, nails, &c.; the ship-joiner to construct and finish the cabin, state-rooms, berths, &c.; the coppersmith, to fasten the copper on her bottom, the rope-maker to furnish the cordage; the sail-maker to cut, sew and fit the sails; the carver to carve the figure-head; the painter, the rigger.

10. *A Book.—Materials.*

WHAT are the materials used to make a book?

Ans. The rags for paper, metal for types to print the letters, leather and morocco for binding, pasteboard and wood for covers, glue and paste to fasten them together, thread to stitch the leaves, gold-leaf to ornament the cover.

11. *Trades employed.*

WHAT are they?

Ans. The rag-merchant, the paper-maker, the stationer, the type-founder, the press-maker, the ink-maker, the pelt-maker, the chase-maker, the compositor, the pressman, the gatherer, the folder, the stitcher, the leather-seller, the binder, the coppersmith, the engraver, the wood-cutter, the copper-plate printer, and the bookseller.

12. *For clothing.—Materials.*

WHAT are the materials of clothing, and from whence?

Ans. From the animal kingdom, as wool from the sheep, hair from the camel and goat, fur from the beaver, ermine, hare, rabbit, &c.; leather from skins of the ox, cow, calf, horse, deer, dog, sheep; silk from the silk-worm, that feeds on the leaves of the mulberry.

What from the vegetable?

Ans. Linen from flax, and muslin from cotton, sail-cloth from hemp.

13. *Parts of Clothing.*

CAN you tell what is made out of wool?

Ans. Yes; broadcloths, flannels, stockings, cassimeres, carpets, &c.

What out of hair?

Ans. Coarse cloths of various kinds—of fur, muffs, tippets, capes, collars—of leather, boots, shoes, saddles, bridles, harness, trunks, linings for carriages, &c.—of silk, dresses, stockings, gloves, waistcoats, handkerchiefs, &c.

What is made of cotton?

Ans. Muslin, chintz, fustian, sheetings, &c.—of flax, linen for shirts, lace, &c.—of hemp, coarse cloths, sail cloth, &c.

14. *Trades employed in Clothing.*

What are these trades?

Ans. For woollens, there are the wool-man, the comber, the spinner, the weaver, the fuller, the dyer, the presser, the packer, and the woollen-draper.

And what for linens?

Ans. The flax-dresser, the spinner, the weaver, the bleacher, the presser, the packer, and the linen-draper.

What for cottons?

Ans. There are the planter, the merchant, the cotton spinner, the weaver, the bleacher, the dyer, the presser, the packer, the warehouseman, and the draper.

Connected with silk, there are the importer, the silk-throwster or spinner, the weaver, the dyer, the presser, and mercer.

15. *Workers in Metal.*

Can you name these trades?

Ans. Yes; in the metallic trades, called the *hardware manufacture*, there is the miner, the smelter, the iron-master, the founder, the scythesmith, the button-

maker, the gunsmith, the sword-blade-maker, the cutler, the polisher, the plater, the finisher, the sorter, the packer, the factor, and the hardware-man.

Can you tell me any thing about mines?—*what* they are, and *where* to be found?

Can you say any thing of the *uses* of the things mentioned above? Buttons, guns, &c.?

16. *Iron Utensils, Tools,* &c.

What are made of iron?

Ans. The utensils of the farmer; his plow, harrow, spade, shovel, hoe, rake, pitchfork, straw-cutter, &c. The tools of mechanics; the saw, the ax, the hammer, the plane, the auger, the chisel. Cutlery of all kinds, razors, knives, lancets. The ship-carpenter has his adz, broadax, hammer, auger, &c.

17. *Blacksmith.*

Who makes these useful instruments?

Ans. The blacksmith and cutler.

See, here is a blacksmith's shop—let us go in. What do you see?

Ans. I see his forge to heat the iron, the *bellows* to blow the fire, the *anvil* on which to hammer the metal, the large hammer, called a sledge, his vice, his rasps and files to smooth and polish his work, his punch, with which he makes holes in the iron whilst it is red-hot.

18. *Gold.*

What is gold? *Ans.* It is a metal.

Where is it found?

Ans. In mines, and in some places it is found on the surface of the ground, mixed with the soil and sand.

Where does it abound most?

Ans. In the mines of South America, in Mexico, and the United States.

What are its qualities?

Ans. It is yellow, bright, heavy, ductile, and malleable.

Explain each of these qualities.

What more can you say of its ductility?

Ans. It is so ductile that an ounce of it will gild a silver wire 1300 miles in length.

What of its malleability?

Ans. It is so malleable that it may be beaten into leaves so thin, that 300,000 are only the thickness of an inch.

What is the comparative weight of metals called.

Ans. Their specific gravity. They are compared with the weight of water, which is an uniform standard.

What is the specific gravity of gold?

Ans. It is 19 times heavier than water.

What are its uses?

Ans. For coin, gilding, and ornaments of various kinds.

19. *Silver.*

What is silver?

Ans. It is a metal found in mines, like gold.

Where has it been found in the greatest quantity?

Ans. In Potosi in Peru, and in Mexico.

What are its qualities?

Ans. It is white, lustrous, heavy, ductile, malleable.

Explain each of these qualities.

What can you say of its ductility?

Ans. It may be drawn out in wire finer than a hair.

What is its specific gravity?

Ans. It is 11 times heavier than water.

What are its uses?

Ans. It is used for coin, and is hence, like gold, one of the precious metals. Many rich and valuable articles are also made of silver, such as dishes, coffee-pots, spoons, &c.

20. *Copper.*

WHAT is copper?

Ans. It is a metal, but less valuable than gold or silver.

Where is it found?

Ans. In mines in most parts of the world.

What are its qualities?

Ans. It is of a reddish color, heavy and malleable.

What is its weight?

Ans. It is 9 times heavier than water.

What are its uses?

Ans. It is used for coin of small value, for the bottoms of ships, spouts, boilers for steam-boats, kettles, &c.

Why is it put on ships?

Ans. To preserve them from the action of the salt water, and worms.

21. *Of Coins.*

[Exhibit the different coins.]

WHAT are coins? *Ans.* Money.

What pieces of money are made of copper?

Ans. Cents and half cents.

What are the silver coins?

Ans. Five cent pieces, or half dimes, ten cent pieces,

or dimes, $6\frac{1}{4}$ cent pieces, $12\frac{1}{2}$ cent pieces, quarter, half, and whole dollars.

What are the gold coins?

Ans. Eagles, half eagles, and quarter eagles.

How many cents make a dime? a quarter of a dollar? a half dollar? three quarters? a dollar? How many dollars make an eagle? half eagle? quarter of an eagle?

What fractional part of a dollar is ten cents or a dime? *Ans.* One-tenth.

What is a fraction?

Ans. It means a piece broken off, and is part of a whole. If you divide this apple into four equal parts, what fractional part of the whole will one piece be? two pieces? three pieces?

Ans. One fourth, two fourths, three fourths.

If you divide it into five equal parts? into six? seven? eight? &c.

Now if you divide a dollar into four equal parts, what will one part be?

Ans. One quarter or one fourth. Two parts? three parts?

What fractional part of a dollar is $12\frac{1}{2}$ cents? 25 cents? 50 cents? 75 cents? $6\frac{1}{4}$ cents? 5 cents? 1 cent?

What part of an eagle is one dollar? two dollars? three? four? five? six? seven? eight? nine? What part of a hundred dollars is ten? twenty? twenty-five? fifty seventy-five?

22. *Of Quicksilver, or Mercury.*

WHAT is mercury? *Ans.* It is a metal.

Where is it found? *Ans.* In mines.

What are its qualities?

Ans. It is of a grayish color, heavy, liquid like water, but becomes solid like ice in extreme cold.

What is its specific gravity?

Ans. It is 14 times heavier than water.

What are its uses?

Ans. A preparation of it is used in medicine, and is called calomel; cinnabar, a beautiful red; and it is also used in weather-glasses.

What is this?

Ans. It is called a thermometer, which means an instrument to measure heat.

What is in this bulb? *Ans.* It is full of quicksilver.

What makes it rise in this little tube?

Ans. The heat; all metals expand by heat and contract by cold.

What do *expand* and *contract* mean?

Ans. Expand means to spread out, and contract means to shrink and grow less. The stove is larger when hot than when cold. When the weather is warm it rises in the tube, and the warmer it is, the higher it rises: when it is cold, it falls.

What are these marks for?

Ans. This is the freezing point; this blood-heat, this summer heat; this fever-heat, and this the boiling point. This low point is called zero, which means cipher or nought.

23. *A Grain of Wheat.*

What kingdom does this grain belong to?

Ans. The vegetable kingdom.

How does it grow?

Ans. After the farmer has plowed his ground, harrowed and prepared it, he sows the seed; after awhile, a little green blade springs up and grows until it becomes tall, and then on the top of the stalk an ear is formed, and this contains the new seed.

Does *one* seed produce many seed?

Ans. Yes; sometimes an hundred fold.

When ripe, what does the farmer do with it?

Ans. He reaps or cuts it with a sickle, binds it up into sheaves, and takes it into the barn.

What does he do with it then?

Ans. He throws down some sheaves on the barn floor, and threshes it with flails; he then *winnows* it, that is, he separates it from the chaff, and puts the wheat into sacks or bins.

What next?

Ans. He next takes it to the mill, and has it ground into flour, the flour is mixed with water and yest, and then baked into bread.

Is all bread made of wheat?

Ans. Some is made of wheat, some of rye, Indian corn, oats, barley, &c.

24. *An Apple-seed.*

WHAT is this? *Ans.* An apple-seed.

What are its color, form, and size?

Ans. It is brown, oval, and a little larger than a grain of wheat.

How does it differ from a grain of wheat? let us *compare* them.

Ans. It differs, first in color, next in form, and it has

no crease, but is smooth on both sides. Now let us cut it open, how does it look beneath the skin?

Ans. It looks white, like the grain of wheat.

What is this white substance?

Ans. It is the *rudiment* of an apple-tree.

Will this little seed grow into an apple-tree?

Ans. Yes; if you plant it in the ground, it will soon appear above the surface, first very small, it then increases in size and becomes a trunk, which puts forth branches, leaves, buds, flowers, fruit, and lastly, seed again like the first.

What holds it fast in the ground? *Ans.* The roots.

Is this what the roots are for?

Ans. Yes, and a great deal more; they imbibe (suck up) moisture and nourishment from the ground, and this is turned into sap, which diffuses itself through every part of the tree, and forms the wood, the leaves, the flowers, fruit and seeds.

What is the juice of the apple called? *Ans.* Cider.

25. *An Acorn.*

What is an acorn? *Ans.* It is the seed of the oak.

Describe it.

The lower part is oval like an egg; the upper part, which is flat, rests in a little cup; it is of a chestnut color, upper part smooth, but the cup is rough outside.

Cut it open—how does it look inside?

Ans. Like the substance of a chestnut.

What is its taste?

Ans. Its flavor is somewhat bitter; acorns are excellent for swine and other animals.

Does the acorn contain the *rudiments* of the oak?

Ans. Yes; like other seed, when planted it grows into a tree, and brings forth fruit *after its kind.*

I have heard that the acorn contains the tree in miniature; let us cut it through in the middle, and see.

Here is an oak leaf—can you describe it?

Ans. Its edges are deeply notched, and, like other leaves, it is smooth and glossy on the upper side, and rough on the lower. Ribs and veins run through it, almost like a tree in miniature.

What are the qualities of oak timber?

Ans. It is hard, heavy, and durable.

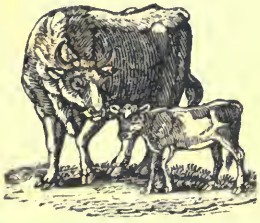
What are its uses?

Ans. For structures of various kinds, houses, ships, &c.

What kind is the most durable?

Ans. Live oak, so called because it remains green all the year.

26. *The Cow.*



To what class of animals does the cow belong?

Ans. Quadrupeds, or mammalia.

Why so called?

Ans. Because she has four feet, and suckles her young

To what *order* does she belong?

Ans. Ruminantia, destitute of cutting-teeth in the upper jaw, hoofs cloven, and chews the cud.

What is the nature of this order?

Ans. Harmless, feed on grass, and hence called herbiferous.

What are the *uses* of the cow?

Ans. Every part of this animal is useful, the flesh, called beef, the fat, called tallow, the bones, horns, hoofs, skin, hair, tongue, and blood. [Teacher remark on each of these.]

Nothing more? *Ans.* Yes; her milk.

What are some of its qualities?

Ans. White, fluid, liquid, wholesome, opaque, nutritious.

What are made of milk?

Ans. Butter and cheese, curds and whey.

How is butter made?

Ans. The cream, which is the oily part of the milk, is churned into butter.

Where does the cream come from?

Ans. It rises to the surface, and is skimmed off.

Why does it rise to the surface?

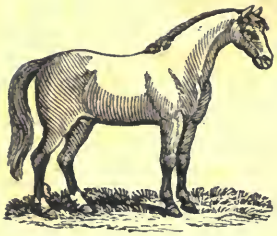
Ans. Because it is lighter than the milk itself.

How is cheese made?

Ans. A substance called runnet is put into the milk to make it curdle, and this curdled substance is collected and pressed into different forms, and this is called cheese.

What is the young called? *Ans.* A calf.

27. *The Horse.*



Of what class is the horse?

Ans. The class mammalia.

Of what order?

Ans. Of the order pachydermata, having blunt fore-teeth in each jaw, and solid hoofs.

What does the horse feed upon?

Ans. Grass, herbage, grain, &c. and is herbiferous.

What are some of the qualities of the horse?

Ans. Strong, generous, docile, fleet, and useful.

What are his uses?

Ans. His skin and hair are useful, his flesh is not eaten.

What are his other uses?

Ans. He is very useful for draught, in wagons, carts, coaches, &c., and also for the saddle.

Is not this excellent creature sometimes very ill treated.

Ans. Yes; often cruelly beaten by unfeeling drivers, and forced to draw loads beyond his strength.

Are there several kinds of horses?

Ans. Yes; the race horse, saddle horse, draft horse, pony, &c.

What is the young horse called?

Ans. It is called a foal or colt.

28. *The Sheep.*

Does the sheep chew the cud?

Ans. It does; and feeds on herbage.

What kind of hoofs has it?

Ans. Cloven hoofs.

And teeth?

Ans. No cutting-teeth in the upper jaw.

Now tell me its class and order.

Ans. Class mammalia, because it suckles its young; and order ruminantia, like the cow.

What is the nature of the sheep?

Ans. It is harmless, inoffensive, and timid.

What are its uses?

Ans. Like the cow, every part of the sheep is useful; its flesh, (called mutton), its fat, skin, &c.

What is its principal use?

Ans. For its wool, which is manufactured into cloths, carpets, stockings, &c. The young sheep is called *lamb.*

29. *The Dog.*

Now let us look at the dog's teeth and claws; what do you see?

Ans. He has teeth in both jaws, and they are sharp; and his toes have nails.

Can you tell the class and order of the dog?

Ans. Class mammalia; and order carnivora, or flesh-eating.

Are there many animals of this order?

Ans. Yes; the lion, tiger, hyena, fox, wolf, cat, &c., are of this order.

Are there many kinds of the dog?

Ans. Yes; the bull-dog, spaniel, pointer, water-dog, setter, hound, lap-dog, &c.

What are the qualities of the dog?

Ans. Sagacious, watchful, faithful, affectionate, and courageous.

What are his uses?

Ans. He is useful to the sportsman, guards the house, and is serviceable to the shepherd.

The young is called puppy.

30. *The Cat.*

Look at the teeth and claws; what do you see?

Ans. I see teeth both above and below, very sharp, and sharp claws.

Why are they sharp?

Ans. That she may catch the mice and tear their flesh and devour it.

Do they eat grass?

Ans. No; their teeth cannot chew it, because they are sharp-pointed.

Can you now tell the class and order of the cat?

Ans. Yes; class mammalia, order carnivora.

Explain these words.

What are the qualities of the cat?

Ans. Agile, watchful, sly, treacherous, playful, cruel.

Explain these words; agile, &c.

What seems to be the natural prey of the cat?

Ans. Rats and mice.

What parts of the cat are useful?

Ans. The fur is used by the hatter and furrier.

Are all cats tame or domestic?

Ans. No; there is a wild species, very ferocious, as large as a dog, of a yellow color with black spots, called a *panther*.

What is the young of the cat called?

Ans. A kitten.

EXERCISES ON CLASSIFICATION.

LESSON FIRST—THE MONKEY.

To what kingdom does the monkey belong.

Ans. Animal.

Explain the word animal.

To what class?

Ans. Mammalia.

What does mammalia mean?

Ans. Those animals that suckle their young.

To what order? *Ans.* Quadrumana.

What does this word mean?

Ans. It means a four-handed animal.

To what genus? *Ans.* Simia.

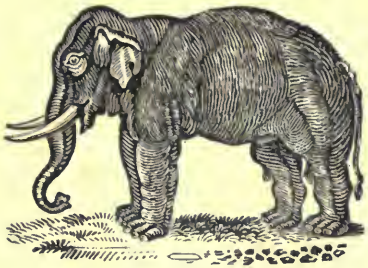
Are there many species of this genus or family?

Ans. Very many.

How is this order distinguished?

Ans. By having *four* cutting-teeth in each jaw, and four extremities resembling hands.

LESSON SECOND.



THE ELEPHANT.

To what *kingdom*, *class*, *order* and genus does the elephant belong?

Ans. Animal kingdom, class mammalia, order pachydermata.

How are animals of this order distinguished?

Ans. By having no fore-teeth in either jaw, and a thick skin.

LESSON THIRD.

THE LION.

To what *kingdom*, *class*, *order*, *genus*, does the lion belong?

Ans. Animal kingdom, class mammalia, order carnivora, genus felis.

How are animals of this order distinguished?

Ans. By their having sharp teeth and claws for tearing their prey.

LESSON FOURTH—THE RABBIT.

To what *kingdom, class, order, genus,* &c., does the rabbit belong?

Ans. Animal kingdom, class mammalia, order rodentia or gnawers, genus rabbit.

How are animals of this order distinguished?

Ans. By having *two* cutting fore-teeth in each jaw.

LESSON FIFTH—THE COW.

To what *kingdom, class, order,* and *genus* does the cow belong?

Ans. Animal kingdom, class mammalia, order ruminantia, genus ox.

How is this order distinguished?

Ans. By being destitute of cutting-teeth in the upper jaw, having cloven hoofs, and chewing the cud.

LESSON SIXTH—THE HORSE.

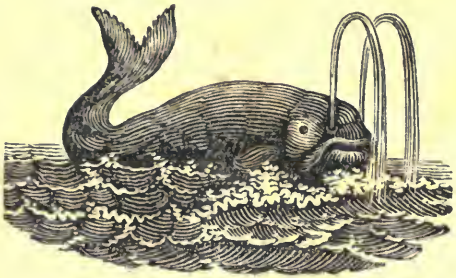
To what *kingdom, class, order,* and *genus* does the horse belong?

Ans. To the animal kingdom, class mammalia, order pachydermata, genus equus or horse.

How is this order distinguished?

Ans. By obtuse or blunt fore-teeth and solid hoofs.

LESSON SEVENTH.



THE WHALE.

To what *kingdom*, *class*, *order*, and *genus* does the whale belong?

Ans. To the animal kingdom, class mammalia, order ceti, genus bellena or whale.

Observations.—These examples it is presumed will be sufficient to show the manner in which exercises on Classification may be conducted. They can be extended to the other departments of nature, as far as may be deemed proper by the teacher.

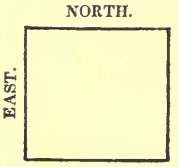
GEOGRAPHICAL SERIES.

Observation.—As the different countries and their relative size and position, may be rendered visible and tangible by means of Maps, their study by the Infants comes within the scope of our design. A regular *plan* must be pursued, the most simple principles first presented and acquired, then gradually and cautiously passing on to those a little more complex, as their tender minds become able to receive them.

MANNER OF STUDYING MAPS.

PREPARATORY EXERCISES.

LESSON FIRST.



WHAT are the *four* cardinal points?

Ans. East, west, north, south.

All rise and turn your faces towards the north—now towards the south—now east—now west.

When you turn your faces towards the north, on which hand is the east?

Ans. On the right hand; south behind, and west on the left.

Which is the north part of the map? *Ans.* The top.

Which the south?—east?—west?

LESSON SECOND.

WHAT are the *three* great geographical divisions?

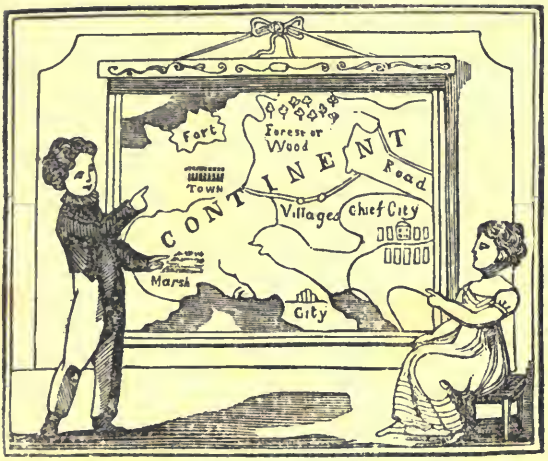
Ans. Natural, political, and *astronomical.*

Explain each of these terms.

1. Natural divisions are those made by nature, as land and water.—2. Political are those made by men, as kingdoms and states.—3. Astronomical are the *lines* and *circles* on the map and globe.

DIRECTION.—Let each of these divisions be pointed out and explained with great care.

LESSON THIRD.



Terms applied to different portions of *Land.*

1. What is a *continent?*

Ans. A large tract of land containing many kingdoms, states, &c.

[Illustrate this by pointing out *all* the continents in the world.]

Europe is a continent, Asia, Africa, New-Holland, America.—The four former in the eastern hemisphere, the last in the western.

What is a hemisphere?

Ans. It means *half* a sphere or globe.

LESSON FOURTH.

2. WHAT is an island?

Ans. An island is land surrounded by water.

[Illustrate this, by pointing out the largest single islands and groups in the world.]

3. What is a peninsula?

Ans. Land *almost* surrounded by water; it is derived from *pene* almost, and *insula* an island.

Ill.—Point out all the principal peninsulas.

4. What is an isthmus?

Ans. A narrow neck of land.

Ill.—Point out all the isthmuses.

5. A *coast*—6. A *cape*—7. A *mountain*—8. *Volcanoes*—Point them out in the same manner.

LESSON FIFTH.

Terms applied to different portions of *Water*.

As 1. Ocean—[Point out the oceans.] 2. Sea—3. Gulf —4. Lake—5. River—6. Estuary. [Let the pointing out of each of these on the map, form an exercise in the same manner; also the *relative* position of each.]

LESSON SIXTH—RIVERS.

1. TRACE some of the largest rivers in North America: name their direction, the countries through which they run, and where they empty.

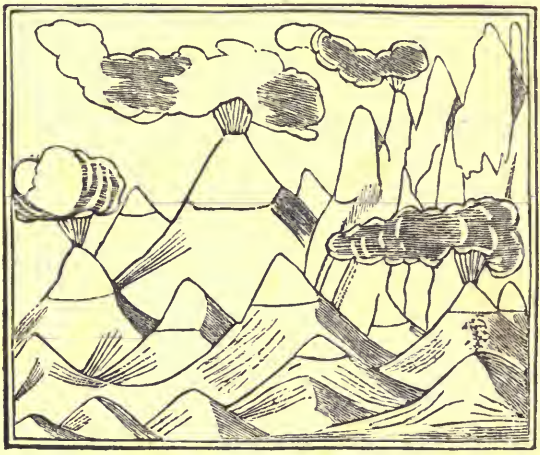
2. The largest rivers in South America, direction, &c.

3. The principal rivers in Europe, course, &c.

4. The most noted rivers of Asia.

5. The chief rivers of Africa.

LESSON SEVENTH.



WHAT are the different ranges or chains of mountains in Europe?

Ans. The Uralian, Dofrine, Alps, Carpathian, Apennines, Pyrenees, and the volcanic mountains of Etna, Vesuvius, and Hecla.

In Asia?

Ans. Taurus, Altay and Yablonoy, Caucasus, Himala, and Gauts.'

In Africa? *Ans.* Atlas, and mountains of the Moon.

In America?

Ans. Alleghany, Rocky, Cordilleras, and Andes.

Tell their direction, relative situation, &c.

2. POLITICAL DIVISIONS.

LESSON EIGHTH—RELATIVE SITUATION.

In what direction does Europe lie from America?

Ans. It lies east.

Why?

Ans. Because it is on the *right-hand* side of America.

How does Africa lie from Europe?

Ans. South, because it is *below* Europe.

How does Asia lie from Europe?—New Holland from Asia?—South America from Africa?—North America from Europe?

What lies between Europe and America?

Where is Austral or South Asia?

Ans. New Holland and the adjacent islands.

Where is Polynesia or Oceana?

Ans. Polynesia (which means many islands) are those islands which lie in the Pacific Ocean.

Where are the West Indies?—Where the Asiatic Islands.

LESSON NINTH—BOUNDARIES.

Bound North America.

North America is bounded north by the Frozen Ocean, east by the Atlantic, south by the Gulf of Mexico and South America, and west by the Pacific Ocean and Bhering's Straits.

How is Europe bounded? Asia? Africa? South America?

LESSON TENTH—GENERAL DIVISIONS.

What are the general divisions of North America.

Ans. Three; *Northern*, *Middle*, and *Southern*.

What does the northern division include?

Ans. New Britain, *Labrador*, *Upper & Lower Canada*, and the *Russian possessions* on the north-west coast.

What does the middle division contain?

Ans. The United States, extending from the Atlantic on the east, to the Pacific on the west.

What does the southern division embrace?

Ans. New Mexico, *Old Mexico*, *Central America*, and the two large peninsulas *Yucatan* and *California*.

LESSON ELEVENTH.

GENERAL DIVISIONS OF THE UNITED STATES.

What are the general divisions of the U. States?

Ans. Four; the northern, middle, southern, and western.

Name the states in each division.

Ans. In the *northern* are the six following—Maine, New-Hampshire, Vermont, Massachusetts, Rhode-Island, and Connecticut; called New-England states.

In the *middle* division are New-York, Pennsylvania, New-Jersey, Delaware, and Maryland.

In the *southern* division are Virginia, N. Carolina, S. Carolina, Georgia, Alabama, Mississippi, and Louisiana.

In the *western* division are Tennessee, Kentucky, Ohio, Indiana, Illinois, and Missouri.

LESSON TWELFTH.

BOUNDARIES OF EACH STATE, BEGINNING WITH MAINE.

THE objects most worthy of notice, and which will require strict attention, are

1. The mountains.

2. The rivers, to trace them, and tell the direction in which they run, and where they discharge their waters; and

3. The principal cities and towns, and their situation.——4. Gulfs.——5. Islands.

LESSON THIRTEENTH—EUROPE.

WHAT are the general divisions of Europe?

Ans. Europe is divided into *three* general divisions; northern, middle, and southern.

What does each division contain?

Ans. The *northern* contains Norway, Lapland, Sweden, Northern Russia, Denmark, and Prussia.

The *middle* embraces England, Scotland, and Ireland, France, Holland, Belgium, Germany, Austria, Switzerland, Poland, and Southern Russia.

The *southern* contains Portugal, Spain, Italy, Turkey, and Greece.

LESSON FOURTEENTH.

BOUND each of the European empires and kingdoms.

Point out the mountains.——The Uralian, Dofrine, Carpathian, Alps, Apennines, Pyrenees, Etna, Vesuvius, and Hecla.

Trace the chief rivers, tell their courses and where they empty, the gulfs and bays, lakes, islands, capes, cities, and towns.

LESSON FIFTEENTH—ASIA.

WHAT are the general divisions of Asia?

Ans. Three; the northern, middle, and southern.

What does each division include?

Ans. The *northern* includes Asiatic Russia, or Siberia. The *middle* division includes Asiatic Turkey, Georgia, Armenia, Persia, Independent Tartary, Chinese Tartary, and Tibet. The *southern* division includes Arabia, Hindoostan, India beyond the Ganges, and China.

LESSON SIXTEENTH.

BOUND each of these subdivisions. Point out the chains of mountains, such as the Taurus in Turkey, Caucasus between the Black and Caspian sea, Altay and Yablonoy south of Siberia, Horeb and Sinai in the north-west of Arabia, and the Gauts in the south of Hindoostan.

Trace the principal rivers, tell their courses, and where they empty. Point out the seas, gulfs, islands, cities, and their relative situation.

LESSON SEVENTEENTH—INDIA BEYOND THE GANGES.

WHAT are the boundaries?

Ans. It is bounded on the north by Tibet; east by China, gulf of Tonquin and the Chinese sea; south by the gulf of Siam and strait of Malacca; and west by the bay of Bengal and Hindoostan.

What are its subdivisions?

Ans. The Birman empire in the west; Laos in the interior; Malacca, Siam, and Cambodia, in the south; Cochin-China and Tonquin in the east.

Point out its gulfs, trace its rivers, and tell the situation of the cities and towns.

LESSON EIGHTEENTH.—AFRICA.

WHAT are the general divisions of Africa?

Ans. Five; the northern, eastern, southern, western, and central.

What does the northern include?

Ans. The Barbary states, called Morocco, Fez, Algiers, Tunis, Tripoli, and Lybia.

What the eastern?

Ans. Egypt, Nubia, Sennaar, Abyssinia, Adel, Ajan, Zanguebar, and Mozambique.

What the southern?

Ans. Sabia, Caffraria, Hottentots, and Cape of Good Hope.

The western division includes Upper and Lower Guinea, Liberia, &c., and Soudan or Nigritia in the interior.

LESSON NINETEENTH—GUINEA.

WHAT are the subdivisions of Lower Guinea?

Ans. Loango, Congo, Angola, Bemba, and Benguela; of Upper-Guinea, the divisions are the Grain-Coast, Ivory-Coast and Gold-Coast, Dahomey, Benin and Biafra.

Point out the capes, islands, mountains; trace the rivers, and name the chief cities and their situation.

LESSON TWENTIETH—SOUTH AMERICA.

WHAT are the general divisions?

Ans. Colombia, Venezuela and Guiana in the north, Brazil in the east, Patagonia in the south, Chili and Peru in the west, and Buenos-Ayres, Bolivia, and Amazonia in the interior.

What are the capes?

Ans. Vela in the north, St. Roque in the east, cape Horn in the south, and Blanco in the west.

What are the mountains?

Ans. The vast chain of the Andes, the highest parts of which are Chimborazo, Cotopaxi, and Pechinca.

What are the chief rivers?

Ans. The Oronoko in the north, the Amazon with its numerous branches, and the Rio de la Plata.

Point out the principal cities in each division, also the islands.

LESSON TWENTY-FIRST.

3. ASTRONOMICAL DIVISIONS.

WHAT are the astronomical divisions?

Ans. The imaginary *circles* on the map and globe.

REMARKS.—These circles result from the *relation* which the Earth bears to the *Sun* in her annual and diurnal motion.

The diurnal rotation gives rise to the *horizon* and *meridians*, the annual rotation to the *equator*, *ecliptic*, *tropics*, and *polar circles*. These circles appertain to the celestial globe, but so far as zones, latitude and longitude are concerned, to the terrestrial globe also. Let the attention of the children be directed to these circles on a globe and map.

It will be difficult to convey a clear idea of these circles, as described on the canopy above, and to transfer them to the earth: perhaps the best method will be to imagine ourselves in the interior of a glass or transparent globe, with the circles on the outside.

Where is the zenith?

Ans. The point over-head. From the zenith to the horizon in every direction is 90°; from one horizon to the other is 180°; the whole circle of the heavens 360°.

LESSON TWENTY-SECOND—LATITUDE.

What is latitude?

Ans. Latitude is the distance from the equator, either north or south.

Point out the parallels of latitude from the equator to the north pole.

From the equator to the south pole.

What is the number of degrees?

Ans. Ninety; thus, ten, twenty, thirty, &c.

Latitude of Places.

In what latitude is the northern part of North America? the middle? the southern?

The northern part of the United States? the middle? the southern?

The northern part of Europe? the middle? the southern?

The northern part of Asia? the middle? the southern?

The northern part of Africa? the middle? the southern?

The northern part of S. America? the middle? the southern?

LESSON TWENTY-THIRD.—LONGITUDE.

How is longitude reckoned?

Ans. East and west, and numbered on the equator.

Where do you begin to reckon?

Ans. At the meridian of Greenwich or London. If you count towards the right hand it is east longitude, if towards the left hand it is west.

EXAMPLES.

What is the longitude of the west of Europe?—the middle?—the east?

What is the longitude of the west of Africa?—the middle?—the east?

What is the longitude of the west of Asia?—the middle?—the east?

What is the longitude of the east of N. America?—the middle?—the west?

What is the longitude of the east of S. America?—the middle?—the west?

What is the longitude of the chief cities of Europe?—Of Asia?—Of Africa?—Of America?

LESSON TWENTY-FOURTH.—THE ZONES.

What is the space between the tropics called?

Ans. The Torrid zone, so named because of its heat.

What is the space between the tropics and polar circles called?

Ans. The Temperate zone, because the climate is temperate.

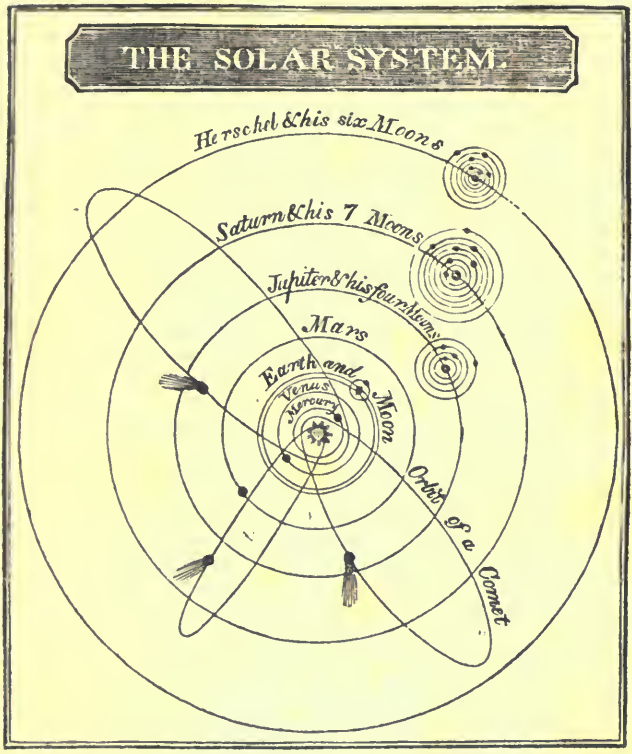
What is the space between the polar circles and the poles called?

Ans. The Frigid zone, because of its coldness.

What is the latitude of the tropics?

Ans. 23½ degrees; and of the polar circles 66½ degrees.

ASTRONOMY.



What does the word *Astronomy* signify?

Ans. It is derived from *astrea*, a star, and *nomas*, a law or rule. It embraces the study of the visible heavens.

Of what does the visible heavens consist?

Ans. Of stars, planets, and comets.

How do the stars differ from the planets?

Ans. They shine with a *twinkling* light, but the planets do not twinkle. The stars are also called *fixed*, because they do not change their relative position.

What does *planet* mean?

Ans. A wanderer, because the planets change their situation.

What does *comet* mean?

Ans. The word is derived from *comè*, hair, because the tails of comets appear like hair.

Solar System.

WHAT does the solar system mean?

Ans. It is called so from *Sol*, which means the sun; because the sun is in the centre, and the *planets* all move round him, in circles called *orbits*.

What does *orbit* mean?

Ans. It means a circle, which is the same as orb, or orbit.

Please, sir, will you tell us about the solar system?

Ans. Yes; now pay attention, and I will tell you first about the *order*, second the *magnitude*, third the *distance*, and fourth the *motion*, or times of revolution of the planets.

Now look at the solar system.

What do you see?

Ans. The sun in the centre, and circles round him.

Now name the *order* of the planets, beginning with the one next the sun.

Mercury, Venus, Earth, Mars, Juno, Pallas, Ceres, Vesta, Jupiter, Saturn, Herschel.

Do you see the circle in which each moves round the sun?

Ans. Yes; and I remember you called them *orbits.*

Now for the *magnitude.* You remember what was said about *diameter* and *circumference?*

Ans. Yes; diameter is the distance through the centre, and circumference the distance round any body.

Well, the diameter of Mercury is three thousand miles, Venus eight thousand, the Earth eight thousand, Mars four thousand, Jupiter eighty-nine thousand, Saturn seventy-nine thousand, and Herschel thirty-four thousand miles.

And what is the size of the small planets or asteroids?

Ans. They are very small; the largest not more than two thousand, and the smallest eighty miles in diameter.

And what is the *circumference* of these planets?

Ans. A little more than *three* times the diameter: thus the earth is *eight* thousand miles in diameter, and a little more than three times that, or *twenty-five* thousand miles in *circumference.*

What is the magnitude of the sun?

Ans. The sun is one million of times larger than the earth; or, it would take a million of bodies like the earth to make a body as large as the sun.

Distance.

What is the distance of the planets from the sun?

Ans. Mercury is 36—Venus 68—Earth 95—Mars 142—Jupiter 486—Saturn 892—and Herschel 1800 millions of miles from the sun.

Times of Revolution.

In what time do the planets respectively move round the sun?

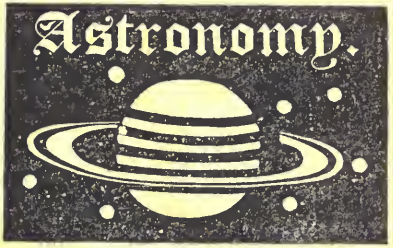
Ans. Mercury revolves round the sun in *three* months; Venus in *seven* months; the Earth in twelve months, or one year; Mars in twenty-two months; Jupiter in twelve years; Saturn in thirty years; and Herschel in eighty-four years.

Are these all the planets belonging to our system?

Ans. No; besides these *primary* or principal planets, there are others called *secondaries*, *satellites*, or *moons*.

Are there many of these moons?

Ans. There are *eighteen* moons; the Earth has one moon, Jupiter four, Saturn seven, and Herschel six.



SATURN.

What else has Saturn?

Ans. A double ring situated at a distance from the body of the planet.

What are the other bodies belonging to our system?

Ans. Comets; they are very numerous, and some of them as large as our earth.

Do they move round the sun like the planets?

Ans. No; they do not move round him in circular orbits, but in orbits that are *elliptical* or *oval.*

The Moon.

Is the moon as large as the sun?

Ans. No; the reason she appears so large, is, because she is so near to us.

How far is the moon from us?

Ans. Only 240,000 miles.

What is the size of the moon?

Ans. She is 2000 miles in diameter, and about 6300 miles in circumference.

Does the moon move round the earth?

Ans. Yes: she accompanies the earth in her annual orbit round the sun; and during that period goes herself nearly thirteen times round the earth in an orbit of her own; thus dividing the year into months or moons.

SERIES ON NUMBERS.

The four general relations of Numbers: Addition, Multiplication, Subtraction, and Division.

FIRST LESSON.

What is this? *Ans.* An apple.

I have cut it into two equal pieces—what is one piece called?

Ans. One half.

I put the two pieces together again—what is it now called?

Ans. A whole apple.

Again, I cut it into three equal parts—what is one piece called?

Ans. One-third.—Two pieces, two-thirds.—The three pieces, a whole.

Now I cut it into four equal parts, five, six, seven, eight, &c. and proceed with each as before.

SECOND LESSON.

Now I cut the apple into two equal parts, and give little John one piece—what will be left?

Ans. One half.

If I cut it into three pieces, and give him one, how many will be left then?

Ans. Two pieces.

If I give him two pieces?

Ans. One left. [So proceed.]

THIRD LESSON.

Count the fingers and thumb on one hand, on both hands—How many on one?—How many on both?

Hold up one finger; how many ones is that?

Ans. One.

Hold up two; how many ones now? *Ans.* Two.

How many twos are there on both hands?

Ans. Five twos.

How many on one hand? *Ans.* Two and one over.

How many threes?—How many fours?

If you hold up your thumb and shut the fingers of one hand, how many will be shut?

Ans. Four.

If you hold up the thumb and finger, how many will be shut?

Ans. Three.

If you hold up the thumb and two fingers?—thumb and three fingers?—how many shut on both hands?

LESSON FOURTH.

EXERCISE in counting in connexion with some object, such as balls or pebbles. Count one, two, three, four, five, &c. Count by twos, one two, two twos, three twos, &c. How many threes? one three, two threes, three threes, &c.—So proceed to any reasonable length, and continue until they are perfect.

Next proceed with the exercises in addition, subtraction, multiplication and division, taking special care to make use of the proper terms, as

Two *and* two, or two *plus* two, for addition.

Three *less* two, or three *minus* two, for subtraction.

Three *times* four, for multiplication.

Four *how many times* two, for division.

FIFTH LESSON.

Figures on the Black Board.

WHAT is this? 1. *Ans.* One.

What does it stand for? *Ans.* One ball, one apple, one pebble, &c.

What is this? 2. *Ans.* Two, and so proceed up to ten.

SIXTH LESSON.

OBSERVATION.—They must be next made to understand the two values of figures.

1. The one which the figure itself expresses.

2. The other value which depends on *place*.

When the figures 1, 2, 3, 4, &c. stand alone, they express the simple value denoted by the figure.

When they are connected together, they express not only this simple value, but another value derived from *place*.

Thus *one* when in the *first* or units place is one—when in the second place it is *ten*, &c.

The nought, or cipher, has no individual value, but only the value of *place;* or it confers a value on other figures by causing them to change their situation.

Thus the cipher 0 by itself is nothing, but placed on the right hand of 1 it converts the 1 into 10 by moving the one into the second place; and so of all others.

How many values have figures?

Ans. Two; the one expressed by the figure itself, the other by its *place.*

What is the first or right-hand place?

Ans. Units; the second *tens,* third *hundreds.*

If you place 2 in the units place, what is it called?

Ans. Two.

In the second place? *Ans.* Twenty.

In the third? *Ans.* Two hundred.

[So proceed with the other figures.]

Has the cipher any value?

Ans. None of itself, but it gives a value to other figures.

How?

Ans. By moving them out of their *places.*

Here is the figure three on the black board; now I put a cipher on the right, what is it now?

Ans. 30.

Why?

Ans. Because the cipher moves it into the second or ten's place.

Now place two ciphers before it—three—four—Now it is 300—3000, &c.

Now here is a row of six figures; divide them into *triads* or threes—how many?

Ans. Two triads—the first triad is hundreds, the second thousands, &c.

Here are nine figures, 9 8 7, 6 5 4, 3 2 1—how many triads now?

Ans. Three; the first hundreds, the second thousands, the third millions.

Read the first, one, twenty-one, three hundred and twenty-one; and so of the rest.

LESSON SEVENTH.

Characters on Black Board.

What is this?	+	*Ans.*	Plus or more.
What is this?	—		Minus or less.
What is this?	×		Multiplication.
What is this?	÷		Division.
What is this?	::		Proportion.
What is this?	=		Equality.

EXAMPLES.

$2 + 2 = 4$, two plus two equals 4.
$3 - 2 = 1$, three less two equals 1.
$4 \times 3 = 12$, four multiplied by three, equals 12.
$6 \div 3 = 2$, six divided by three equals 2.
$2 : 4 :: 6 = 12$, as two is to four, so is six to twelve.

Exercises on these relations may be repeated and extended at pleasure.

ALPHABETICAL SOUNDS.

FIRST EXERCISE.

On the vowel sounds, a, e, i, o, u and y.

SECOND EXERCISE.

On the consonants, b, c, d, f, g, h, j, k, l, m, n, p, q, r, s, t, v, w, x, z.

THIRD EXERCISE.

The labials, or those formed by the lips, b, f, m, p, v, w.

FOURTH EXERCISE.

The dentals, or those formed by the teeth, c, g, h, j, s, x, z.

FIFTH EXERCISE.

The liquids, or those formed by the tongue, d, l, n, r, t.

SOUNDS OF EACH VOWEL.

A.

A has four sounds, viz. as in fāte[1], făt[2], fär[3], fâll[4].

E.

E has two sounds, viz. as in mēte[1], mĕt[2].

I.

I has two sounds, as in pīne[1], pĭn[2].

O.

O has four sounds, as in nōte[1], nŏt[2], nör[3], môve[4].

U.

U has two sounds, as in tūbe[1], tŭb[2].

th as in *thin;* th as in *this.*

SERIES ON GRAMMAR.

OBSERVATION.—Children of a tender age may be made to understand a few general principles on this subject, if introduced to their notice in a skilful manner, and on proper occasions. Having advanced thus far, they will have acquired a stock of materials which may be used advantageously to illustrate some of the more prominent features of Grammar.

All the *parts of speech* will be found to originate in the *objects* of nature, their *qualities*, their *action* and *modes* or *manner* of action, their *substitution* for and *relations* to each other, and their various *connexions*. Thus objects give rise to *nouns*, qualities of objects to *adjectives*, actions to *verbs*, modes of actions to *adverbs*, the substitution of one word for another gives rise to *pronouns*, relations to *prepositions*, and connexions to *conjunctions*.

The variations of these parts of speech give rise to *number*, *gender*, *case*, *mood*, and *tense;* which distinctions are designated either by *terminations* or prefixes.

LESSON FIRST.

Of the Nouns or Things.

ALL objects in nature are nouns.

What is man? *Ans.* Man is a noun.

Why is man a noun? *Ans.* Because it is an object.

What is an object?

Ans. Any thing we can see.

What is woman? child? boy? girl? beast? bird? insect? vegetable? mineral? sun? moon? star? &c.

LESSON SECOND.

Of Qualities or Adjectives.

All qualities of nouns are adjectives. What qualities belong to the noun man?

Ans. *Good* man, *bad* man, *rich* man, *poor* man, *large* man, *small* man, &c.

What qualities belong to woman?

Ans. Beautiful woman, kind, lovely, industrious, cheerful, graceful, &c.

What qualities belong to a horse? cow? eagle? swan? tree? gold? silver? iron? sun? moon? &c.

LESSON THIRD.

Of Actions or Verbs.

All actions are expressed by verbs.

What actions can be expressed of man?

Ans. Man works, reads, writes, talks, &c.

Are these verbs? *Ans.* Yes; they all denote *action.*

What actions can be expressed of horse? sheep? dove? fish? bee? worm? lion? child? ship? wind? sun? moon? stars? &c.

LESSON FOURTH.

Of the Adverbs.

Adverbs express the manner, time, place, degree, &c. of verbs.

What adverb expresses manner? time? &c.

Ans. The boy reads *well;* adverb of manner.
The girl will come *soon;* ad. of time.
My mother came *here;* ad. of place.
The candle burns *brightly;* " manner.
The bird flies *swiftly;* " manner.
The woman sings *sweetly;* " manner.

LESSON FIFTH.

Of the Pronoun.

Pronouns stand for nouns.

I, thou, he, she, and *it* are *personal* pronouns.

Who, which, what, and *that* are *relative* pronouns.

EXAMPLES.

I teach you—*I* saw James, *he* is a good boy—*I* told Louisa *she* hurt *me*—*he* caught a bird, *it* was beautiful—here is a rose, *it* is red.

What does *I* stand for? *Ans.* Myself.
What does *he* stand for? *Ans.* James.
What does *she* stand for? *Ans.* Louisa.
What does *it* stand for? *Ans.* Bird, rose.

LESSON SIXTH.

Of the Preposition.

Prepositions express relations, and refer to place or position.

EXAMPLES.

It lies *on* the table.

What does *on* express? *Ans.* Position.

It lies *under* the table—the bird flew *over* the house—we rode *through* the street—she went *into* the house—I went *to* the market—William passed *by* the door—she went *from* home.

Do these words express position?

Ans. Yes; *on*, *under*, *over*, &c. and hence are called prepositions.

LESSON SEVENTH.

Of the Article.

Articles are placed before nouns to express a *general* or *particular* meaning; they are *a*, *an* and *the*.

EXAMPLES.

A man, *a* boy, *a* girl, *a* rose, *an* apple, *an* egg, *an* inkstand, *an* orange, *an* honest man, *an* humble person. These are called *indefinite* articles.

The book, *the* ball, *the* table, *the* house, *the* houses, *the* chair, *the* chairs, *the* top, *the* tops. These are called *definite* articles.

LESSON EIGHTH.

Of the Conjunction.

The conjunction *connects* words together; they are such words as *and*, *but*, *nor*, *or*, *either*, &c.

EXAMPLES.

James *and* John—Sarah *and* Maria—she is better, *but* she is not quite well—neither she *nor* her sister was here—either John *or* his brother did it.

LESSON NINTH.

Of Number.

THERE are two numbers, *singular* and *plural.*

What does singular mean? *Ans.* One.

And plural? *Ans.* More than one.

EXAMPLE.

Man means one man, men more than one man.

Woman, women; boy, boys; girl, girls; apple, apples; kite, kites; bird, birds; tree, trees; chair, chairs; table, tables; watch, watches; house, houses; ball, balls.

LESSON TENTH.

Of Gender.

GENDER is the distinction of sex.

How many sexes are there?

Ans. Two, male and female, called masculine and feminine gender.

What are things without life.

Ans. Of the neuter gender, that is, neither one nor the other.

EXAMPLES.

Man, woman, boy, girl, father, mother, uncle, aunt, nephew, niece, son, daughter;—bull, cow, lion, lioness, tiger, tigress;—tree, rose, table, chair, book, &c.

LESSON ELEVENTH.

Of Case.

There are three cases, the nominative, possessive, and objective.

What is the nominative case?

Ans. The person that acts or does any thing is called the agent or actor, and is nominative; as *Sarah* reads, *John* writes, *James* spells, the *horse* trots, &c.

What does possessive mean?

Ans. It means property or possession, as William's book, Maria's slate, the boy's hat, birds' feathers, eagles' wings, &c.

What does objective mean?

Ans. That which is acted *upon*, as John loves *play*, Jane reads her *lesson*, Eliza loves her *sister*.

Which are acted upon here?

Ans. Play, lesson, and sister.

	Sing.	*Plur.*	*Sing.*	*Plur.*
Nom.	Book	Books	Man	Men
Poss.	Book's	Books'	Man's	Men's
Obj.	Book	Books.	Man	Men.

LESSON TWELFTH.

Declension of Pronouns.

Singular.		*Plural.*
Nom.	I,	We,
Poss.	My or mine,	Our or ours,
Obj.	Me,	Us,
Nom.	Thou,	You or ye,
Poss.	Thy or thine,	Your or yours,
Obj.	Thee,	You,
Nom.	He,	
Poss.	His,	
Obj.	Him,	
Nom.	She,	They.
Poss.	Her or hers,	Theirs.
Obj.	Her,	Them.
Nom.	It,	
Poss.	Its,	
Obj.	It,	
Nom.	Who.	
Poss.	Whose.	
Obj.	Whom.	
Nom.	Whosoever.	
Poss.	Whosesoever.	
Obj.	Whomsoever.	

THE END.

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